Special Catalogue of . . .

No. 8.

McCLAVE Patent
Grate Bars, and
"Argand" Steam Blowers.

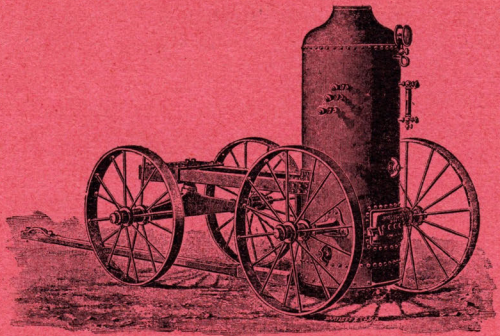
Steam Boilers . . . and Engines.

JAMES BEGGS & CO.

No. 9 Dey Street,

. . New York.

BOILER MAKERS,
IRON FOUNDERS
AND MACHINISTS.



VERTICAL BOILER, MOUNTED ON WHEELS.

For Specifications, see page 71.

MANUFACTURERS OF - -

Improved Steam Engines, Marine and Stationary Boilers,
Foundry Cupolas, Coal Buckets, Tanks, Smokestacks,
And other PLATE IRON or STEEL WORK of any Description.

McCLAVE Patent Shaking, Dumping and Cut-off Grate Bars,
And "Argand" Steam Blowers.

- Steam and Power Pumps, Feed-Water Heaters, Injectors, Ejectors, - -

PULLEYS, HANGERS, SHAFTING, COUPLINGS, ETC.

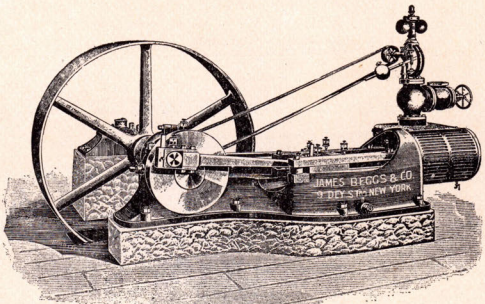
JAMES BEGGS & CO.,

PRACTICAL ENGINEERS
AND MACHINISTS,

No. 9 DEY STREET, = = = NEW YORK, N. Y.

In ordering state whether right or left-hand Engine is wanted. The engraving shows a right-hand Engine.

If not otherwise mentioned in order, we will understand that either hand will answer.



Every Engine is run with Steam at our works, and thoroughly tested under a full load, to insure reliable working conditions upon arrival at its destination.

SPECIFICATIONS OF HORIZONTAL STATIONARY STEAM ENGINES, WITH OUR DESIGN OF IMPROVED BALANCED SLIDE-VALVES.

Number of Size	1E	1D	1C	1R	1A	1	2	3A	3	4A	4	5A	5	6A	6	7A	7	8A	8	9
Horse-Power, as usually rated	10	15	20	25	30	35	40	45	50	55	60	70	80	90	100	125	150	175	200	250
Usual number of revolutions per minute	45	50	90	115	130	150	150	135	150	140	150	135	150	135	160	115	135	115	130	120
Diameter of Cylinder by Length of Stroke...in inches	10x15	10x15	10x15	10x15	10x15	10x15	11x15	12x16	12x16	13x16	13x16	14x18	14x18	16x18	16x18	18x22	18x22	20x24	20x24	22x28
Diameter of Crank-Shaft..... "	4¼	4¼	4¼	4¼	4¼	4¼	4¼	5¼	5¼	5¾	5¾	6	6	6¼	6¼	8¾	8¾	10	10	11
Length of Shaft from center of Engine..... in feet	6	6	6	6	6	6	7	7	7	7	7	7½	7½	8	8	9	9	9½	9½	10
Diameter by Length of Main Shaft Bearings..... in inches	4½x11	4½x11	4½x11	4½x11	4½x11	4½x11	4½x11	5½x13	5½x13	5½x13	5½x13	6x14	6x14	6½x15½	6½x15½	8½x18	8½x18	10x20	10x20	11x22
Diameter of Crank-Pin..... "	2½	2½	2½	2½	2½	2½	2½	3	3	3½	3½	3½	3½	4	4	4½	4½	5	5	5½
Diameter of Steam-Pipe and Governor..... "	2½	2½	2½	2½	2½	2½	3	3½	3½	3½	3½	4	4	5	5	6	6	6	6	8
Diameter of Exhaust-Pipe..... "	3½	3½	3½	3½	3½	3½	4	4½	4½	4½	4½	5	5	6	6	7	7	7	7	8
Diameter of Band-Wheel by Face..... "	60x8	60x9	66x10	72x10	72x12½	72x12½	72x15½	78x15	78x15	78x17	78x17	84x17	84x17	84x19	84x19	90x24	90x24	108x29	108x29	120x32
Weight of Band-Wheel in Rough..... in pounds	.....	.....	.....	.....	1,100	1,100	1,200	1,650	1,650	1,800	1,800	2,200	2,200	3,000	3,000	4,500	4,500	5,500	5,500	7,000
Length of Engine-Bed, about..... in feet	7½	7½	7½	7½	7½	7½	7½	8	8	9	9	8½	8½	9	9	10½	10½	12	12	13½
Width of Engine-Bed..... in inches	29½	29½	29½	29½	29½	29½	29½	35½	35½	35½	35½	38	38	40½	40½	55	55	56	56	58
Shipping Weight, in pounds..... about	3,600	3,600	3,700	3,800	3,800	3,800	4,200	5,800	5,800	6,000	6,000	7,700	7,700	10,500	10,500	17,350	17,350	26,700	26,700	30,800
Engine, with Regular Fixtures.....	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$

The Regular Fixtures comprise: Continuous Sight-Feed Cylinder Lubricator; Oil Cups; Drips from Cylinder; Improved Governor, with Patent Automatic Safety Stop Attachment (which effectually prevents the running away of Engine) and Adjustable Speeder; Throttle Valve and Band-Wheel, turned and balanced, per specifications. This Governor is sensitive and accurate, enabling a close adjustment and superior regulation of speed under varying conditions of loads and steam pressure.

FLY-WHEELS AND SMALL BAND-WHEELS SUBSTITUTED FOR THE REGULAR BAND-WHEELS, WHEN SO ORDERED, AT THE ADDITIONAL PRICE

Diameter of Fly-Wheel..... in inches	72	72	72	72	84	84	84	86	86	86	86	96	96	96	96	108	108	120	120	120
Weight " " in rough..... in pounds	.....	.....	.....	.....	.....	1,200	1,500	2,000	2,000	2,500	2,500	3,000	3,000	3,500	3,500	4,000	4,000	6,000	6,000	8,000
Diameter of Band-Wheel, by Face..... in inches	44	44	44	42	42	42	42	48	48	48	48	60	60	60	60	60	60	72	72	78
Weight of " " in Rough..... in pounds	10½	12½	12½	12½	12½	12½	15	15	15	15	15	17	17	19	19	21	21	24	24	26
Price, additional.....	$	$	$	$	$	$	600	700	800	800	800	1,300	1,300	1,450	1,450	1,600	1,600	2,200	2,200	2,500

The stated capacities of the Engines given in the List can be exceeded in cases of emergency.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

DESCRIPTION OF DETAILS.

OUR engines are heavy and substantial, simple in design and effective, being intended for hard and enduring service ; they are made with great care and from patterns of our latest design, combining all our most recent improvements suggested by many years of experience in engine building, are plainly but strongly constructed ; require the least possible attention and repairs, and, by reason of their superior workmanship and simplicity, can be placed in charge of persons having little experience in the care of steam engines. Consequently skilled and experienced attendan. is not required. Many of the engines on the market have more bright work than ours, and are, to some, more pleasing to the eye, but when the proportions of the different parts are compared it will be found, in most instances, that they are much weaker in build, and that they cannot stand as hard work and will not last as long as ours. We have shipped our engines to almost every part of the world, and more than 12,000 of them are in use.

We guarantee these engines to have ample cylinder capacity to develop the full indicated Horse-power stated, when speeded to run at about the given number of revolutions per minute. All parts are properly proportioned throughout, in accordance with the cylinder power as specified.

The Working Parts are of unusually large dimensions, and constructed in the simplest manner, being provided with suitable means for adjustment and compensation, so that should it become necessary, through an extension of business, to realize a corresponding increase of power, the number of revolutions may be increased within reasonable limits, depending, of course, upon the working conditions, and a proportionate increase of power secured thereby. *This is done*, and with the full assurance that these engines will continue to perform their work in an entirely satisfactory manner. A number of these engines are running to the satisfaction of the customers, at speeds of 50 per cent. and upwards above their rated capacity, but we do not recommend such an extreme practice, as it is both unwise and extravagant.

The Crank Shaft is made of well Hammered Wrought Iron of best quality.

The Crank Pin is made of well Hammered Steel of best quality.

The Main Shaft Bearing and Outboard Pillow Block are lined with genuine Anti-attrition Metal.

The Connecting Rod is extra strong, of best Wrought Iron, well Hammered. The ends are fitted, locomotive practice, with straps secured by bolts and key with set screw, and have composition boxes. In the cross-head end of our connecting-rod we have a box with square end, instead of the usual round shape, leaving a large fillet in the corners for strength. We do this because the old style of round box continually works loose, and is, therefore, a perpetual source of annoyance. All the disadvantages of the round box are, in our form, successfully overcome.

The Cross-Head Pin is extra large, to prevent excessive friction and insure greater durability. In many other styles of engines these pins are very much smaller than they ought to be, and with a full load are very troublesome from consequent heating and cutting ; therefore they have to be very soon replaced.

The Cross-Head and Slides are of the well-known locomotive type ; the slides are of extra length, and, therefore, the cross-head has nearly one-half more wearing surface than is usually given to engines of this class ; all wearing surfaces of cross-head are faced with genuine Anti-attrition Metal.

Our form of Eccentric and Strap was introduced upon locomotives many years ago, and has proved itself the most durable of any form yet introduced. It combines all the advantages of a spherical surface without the extra expense attendant upon its manufacture. The strap is formed to hold a quantity of oil, which is essentially necessary in case the oil cup stops feeding, so that the danger of cutting the surface of eccentric and strap from this cause is next to nothing. It will not wobble or vibrate, as a spherical strap sometimes does.

The Ports, of which there are **four,** are nearly equal in length to the diameter of the cylinder, and located as near its ends as possible, in order to reduce the clearance and thereby economize the use of steam. These ports are proportionately large, and so located as to insure perfect drainage, which, combined with a short travel of valve, prevents unnecessary friction, and admits of a higher rate of speed than with ordinary types of engines.

The Valve is double and covers the ports at each end of steam chest. The back of this valve is covered by a steam-tight packing, leaving only a sufficient surface exposed to insure the valve being kept in contact with the valve seat under all conditions of load ; this means a reduction of friction and an increase of about 80 per cent. in the durability of the eccentric-strap, rod-pin and all parts of the valve motion. The valve and valve seat being relieved of the greater portion of their load, very little lubrication is required, which is a very essential consideration where the exhaust steam is used for chemical purposes, or where any considerable quantity of oil would be a serious detriment to the process.

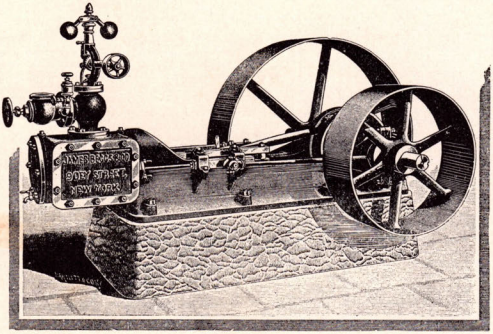
The Piston is in one piece, being a casting cored out, for lightness, and being pressed on to the piston rod is securely held.

The Piston Packing Rings are of an improved type, combining the most desirable results of recent locomotive practice and are sprung into grooves turned in the piston, with the openings held about two inches from each other on the underside, to avoid the possibility of leakage. These packing rings are plain, simple, and easily renewed at a trifling expense. This style of packing has been extensively adopted on Railroads, as it works with less friction than other forms of packing ; it is more durable and much to be preferred to the "spring" and "steam" packings so generally used by engine builders, as we use no springs and do not admit steam behind these rings. The objection to all forms of "steam" packing, principally those above alluded to, is that they wear the cylinder out of true, causing it to resemble the mouth of a bell at each end.

No effort is spared to make these the best Slide-valve Engines in the market ; and the parts are made accurately to gauge on the interchangeable part system, so as to facilitate renewals in case of wear.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

Every Engine is run with Steam at our Works, and thoroughly tested under a full load, to insure reliable working conditions upon arrival at its destination.



SPECIFICATIONS OF HORIZONTAL, SELF-CONTAINED ("CENTER-CRANK") STEAM ENGINES, WITH OUR DESIGN OF IMPROVED BALANCED SLIDE-VALVES.

	1 C	1 B	1 A	1	2	3	4	5	6	7 A	7	8	9 A	9	10 A	10	11 A	11	12 B	12 A	12
Number of Size																					
Horse-Power, as usually rated	5	6	7	8	10	12	15	20	25	30	35	40	45	50	55	60	65	70	80	90	100
Usual number of revolutions per minute				200	175	175	150	150	150	150	150	150	135	135	140	150	140	150	120	135	150
Diam. Cylinder by Length of Stroke, in inches	6x9	6x9	6x9	6x9	7x10	8x10	8x12	8x12	10x12	10x12	10x12	11x12	12x12	12x12	13x12	13x12	14x12	14x12	16x12	16x12	16x12
Diam. by Length of Crank-shaft ..... **in inches**	2⅝x49	2⅝x49	2⅝x49	2⅝x49	2⅝x53	2¾x54	2¾x56	3⅜x56	3⅜x66	3⅜x74	3⅜x74	4⅛x73	4⅛x77	4⅛x77	4⅛x77	4⅛x77	4⅝x78½	4⅝x78½	5⅛x88	5½x88	5½x88
Diam. by Length of Crank-Shaft Bearings	2⅝x3½	2⅝x3½	2⅝x3½	2⅝x3½	2¾x3	2¾x3½	3x7	3½x7½	3½x7½	4¼x7½	4¼x7½	4¼x8½	4¼x10	4¼x10	4½x10	4½x10	5⅛x12	5⅛x12	5½x14	5½x14	5½x14
Diameter of Crank-Pin	1¼	1¼	1¼	1¼	1½	1⅝	2⅛	2⅝	2⅝	3⅛	3⅛	3⅝	4⅛	4⅛	4⅛	4⅛	4⅝	4⅝	5⅛	5½	5½
Diameter of Main Journal	1¼	1¼	1¼	1¼	1½	1⅝	2	2½	2½	3	3	3½	4	4	4	4	4½	4½	5	5	5
Diameter of Exhaust Pipe	1¼	1¼	1¼	1¼	1½	1½	2	2	2	2	2	2	2½	2½	2½	2½	3	3	3	3	3
Size of Large Band-Wheel, diam. by face ..... **in inches**	36x9⅝	36x9⅝	36x9⅝	36x9⅝	44x10⅝	44x12½	48x12½	54x12⅝	54x12⅝	60x14⅜	60x14⅜	60x14⅜	72x16⅛	72x16⅛	72x16⅛	72x16⅛	72x16⅝	72x16⅝	78x16⅝	78x16⅝	78x16⅝
Weight of Large Wheel in the rough ..... **in pounds**	250	250	250	250	340	420	510	650	650	850	850	850	1,100	1,100	1,300	1,300	1,300	1,300	1,810	1,810	1,810
Size of Small Band-Wheel, diam. by face ..... **in inches**	16x10⅝	16x10⅝	16x10⅝	16x10⅝	20x10⅝	20x10⅝	22x10½	22x10½	22x10⅝	26x10⅝	26x10⅝	26x12⅝	26x12⅝	26x12⅝	26x12⅝	26x12⅝	26x12⅝	26x12⅝	48x12⅝	48x12⅝	48x12⅝
Weight of Small Wheel in the rough ..... **in pounds**	95	95	95	95	125	125	220	220	220	320	320	320	360	360	360	360	360	360	540	540	540
Shipping Weight in pounds ..... **About**	1,400	1,400	1,400	1,400	1,700	2,100	2,450	3,100	3,400	4,200	4,200	4,700	6,000	6,000	8,500	8,500	7,800	7,800	13,000	16,000	18,000
Engine, with Regular Fixtures	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$

The Regular Fixtures comprise: Lubricator; Oil Cups; Drips from Cylinder; Governor, with Throttle-Valve; and two Band-Wheels, turned and balanced, per Specifications above.

The stated capacities of the Engines given in the List can be exceeded in cases of Emergency.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

DESCRIPTION OF DETAILS.

THE Crank-Shaft is cut from the solid forging and has no welds to weaken the shaft or to separate. Each side of crank is provided with our improved full disk, very securely attached, and contains a counterweight, thereby accurately balancing the reciprocating parts, so that the engine runs easily and steadily with the least possible friction. A good-sized fillet is formed upon the shaft at each side of the crank, also at each end of the crank-pin there are no square corners or shoulders, where the vibrations can concentrate which, in time, always causes a crystallization of the material, and a broken shaft is the result. By this means the vibrations are taken up and distributed throughout the length of the shaft.

The Bed is "hooded" at the cylinder end, thereby securing great strength and rigidity.

The Eccentric-Rod Pin, which connects the eccentric-rod with the valve-stem guide, is so made that by removing a nut the pin can be withdrawn and end of eccentric-rod lowered, so that the valve may be removed from steam-chest without disconnecting the eccentric-strap

The Stuffing Boxes for piston-rod and valve-stem are of the well-known locomotive type, consisting of gland, secured and adjusted by two studs with hexagon nuts. This method is far superior to the common arrangement of nut and thread used by some builders, as the threads corrode and strip off, after which it is next to impossible to repair them.

The Cylinder is of the improved "overhung" type and is cased with a non-conducting hot-air jacket to economize the use of steam by preventing, as far as possible, loss of heat through radiation and consequent condensation of steam in the cylinder. The "overhung" cylinder, as adopted on our engines, has the following advantages: A cylinder attached to the end, instead of the top, of a bed-plate bring the strains directly on a line with the center of crank-shaft, hence there is little or no tendency to buckle the bed while the engine is working; with the old style of "box-bed" there is a tendency to spring the bed and work it loose upon the foundation, more especially where the foundation is at all elastic or unsound. This objection is satisfactorily overcome in our style of bed. Another advantage of the "overhung" cylinder is: The expansion and contraction of its various parts may proceed without interruption, because it is held only by one end. A cylinder may also be changed and a new one substituted, without disturbing the main bed; and all parts are readily accessible for examination or repairs, which features do not obtain to such a degree in other styles of engines.

The Piston and Valve-Rods are of steel.

MORE THAN 12,000 ENGINES AND 25,000 BOILERS, OF OUR MAKE, ARE IN USE.

Every Engine is run with Steam at our Works and thoroughly tested under a full load to insure reliable working conditions upon arrival at its destination.

MEDIUM SPEED SINGLE VALVE AUTOMATIC CUT-OFF ENGINES.

The engraving represents our improved medium speed Automatic Cut-off Stationary Engine, which is especially designed for use in mills and electric light and power plants, where close regulation and economy of steam are required, without the expense and care of a high speed engine.

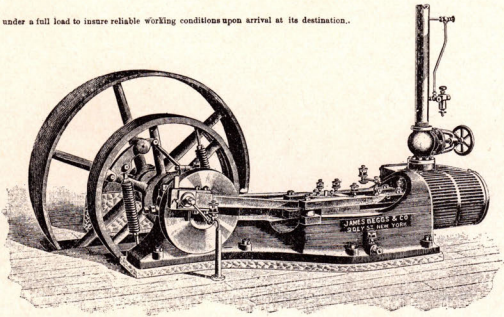
For isolated electric light plants, where the service is constant, the low price and fine regulation of the Engine make it particularly desirable.

The governor is simple in construction, and is exceedingly sensitive to the changes in duty required of the Engine.

The ports are nearly equal in length to the diameter of the cylinder, and are so located as to insure perfect drainage.

The main pillow-blocks are long and fitted with quarter-boxes.

All working parts are extra large; the crank-pin, piston and valve-rods are steel; and the engine is thoroughly well made throughout.



SPECIFICATIONS OF ENGINES.

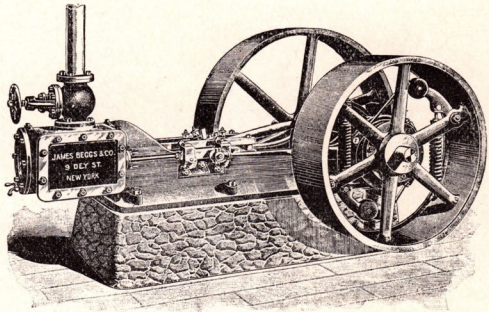
Number of Size	1	2	3	4	5	6	7	8	9
Rated Horse-Power (at 40 lbs. M. E. P. and ¼ cut off)	45	55	70	85	100	130	180	225	300
Revolutions per minute	200	200	200	200	180	180	160	150	140
Diameter of Cylinder by Length of Stroke ... in inches	10×15	11×15	12×16	13×16	14×18	16×18	18×22	20×24	22×26
Diameter of Crank-Shaft ... in inches	4¼	5½	5½	6¾	6¾	7½	8½	10	11
Length of Shaft from Center of Engine ... in feet	6	6	7	7	7½	8	8½	9½	10
Diameter by Length of Shaft Bearings ... in inches	4½×11	5½×11	5½×13	6¾×13	6¾×14	7½×15½	8½×18	10×20	11×22
Diameter of Crank Pin ... in inches	2¾	2¾	3	3½	3½	4	4½	5	5½
Diameter of Steam Pipe ... in inches	3	3½	4	4	4½	5	6	6	7
Diameter of Exhaust Pipe ... in inches	4	4½	5	5	5	6	7	7	8
Length of Engine Bed ... in feet	7½	7½	8	8	8½	9	10½	12	13½
Width of Engine Bed ... in inches	29½	29½	35½	35½	38	40½	58	36	58
Size of Governor Wheel, Diameter by face ... in inches	36×7	36×7	40×7	40×7	44×7½	44×7½	48×10	54×10½	60×10½
Size of Band Wheel, " ... in inches	54×12½	54×12½	60×14½	60×14½	72×16½	78×20½	84×24½	96×30½	108×36½
Weight of Band Wheel in the rough ... in pounds	1,500	1,560	1,640	1,640	2,000	2,280	4,700	6,000	7,800
Shipping Weight, in pounds ... about	5,000	5,350	6,700	7,000	8,900	11,100	20,150	30,200	35,000
Engine, with Regular Fixtures ... $	$	$	$	$	$	$	$	$	$

The Regular Fixtures comprise: Automatic Oiling Device for Crank-Pin and Cross-Head; Large Size Continuous Sight-Feed Cylinder Lubricator; Full Set Sight-Feed Oil Cups; Drips From Cylinder; Two Band-Wheels, turned and balanced, per specifications; and Throttle-Valve.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

Every Engine is run with Steam at our Works, and thoroughly tested under a full load to insure reliable working conditions upon arrival at its destination.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.



AUTOMATIC CUT-OFF ENGINES.

The engraving represents our improved medium speed Automatic Cut-off, Self-contained ("Center-Crank") Engine, which is especially designed for use where good regulation and economy of steam are required, without the expense and care of a high speed engine.

For electric light and power stations in mills, factories or stores where the service is constant, the fine regulation and comparatively low cost of the engine make it particularly desirable.

The governor is simple in construction, and is exceedingly sensitive to the changes in duty required of the engine.

The ports are nearly equal in length to the diameter of the cylinder, and are so located as to insure perfect drainage.

The main pillow-blocks are long, and fitted with quarter-boxes.

All working parts are extra large; the crank is a solid forging, and the piston and valve-rods are steel; the Engine is thoroughly well made throughout.

SPECIFICATIONS OF ENGINES.

Number of Size	1	2	3	4	5	6	7	8	9	10	11	12
Rated Horse-Power (at 40 pounds M. E. P. and ¼ cut-off)	12	15	20	25	30	35	45	55	70	85	100	130
Revolutions per minute	240	210	210	210	200	200	200	200	200	200	200	180
Diameter of Cylinder by Length of Stroke ... in inches	6x9	7x10	8x10	8x12	9x12	10x12	10x15	11x15	12x16	13x16	14x16	16x18
Diameter of Crank-Shaft ... "	2⅜	2⅝	2¾	3	3⅜	3⅝	3¾	4⅛	4¼	4¼	5¼	5¾
Whole Length of Crank-Shaft ... "	40	42	44	47	49	53	59	61	65	65	71	80
Diameter by Length of Crank-Shaft Bearings ... "	2⅜x5	2⅝x6	2¾x6	3x7	3½x7½	3¾x8½	3¾x8½	4⅛x9	4¼x10	4¼x10	5¼x12	5¾x14
Diameter of Crank-Pin ... "	2⅜	2½	2⅝	2¾	3¼	3½	3½	4¼	4¼	4¼	5¼	5¾
Diameter of Steam-Pipe ... "	1¼	2	2½	2½	3	3	3	3½	4	4	4½	5
Diameter of Exhaust-Pipe ... "	2	2½	3	3	4	4	4	4½	5	5	6	6
Size of Band-Wheel, diameter by face ... "	44x7½	48x8½	48x8½	48x10½	54x10½	54x10½	54x12½	54x12½	60x14½	60x14½	66x16½	78x20½
Size of Governor-Wheel, diameter by face ... "	30x8½	30x8½	34x8½	34x 8½	36x 8½	40x10½	42x10½	42x10½	48x12½	48x12½	48x12½	54x12½
Shipping Weight, in pounds ... about	1,700	2,100	2,500	2,900	3,900	4,300	5,100	5,600	6,900	7,200	8,500	11,700
Engine with Regular Fixtures ...	$	$	$	$	$	$	$	$	$	$	$	$

The Regular Fixtures comprise: Automatic Oiling Device for Crank-Pin and Cross-Head; large size continuous Sight-Feed Cylinder Lubricator; Full Set Sight-Feed Oil Cups; Drips from Cylinder; Two Band-Wheels, turned and balanced, per specifications; and Throttle-Valve.

HIGH SPEED SINGLE VALVE AUTOMATIC CUT-OFF ENGINES.

These engines are especially designed for electric light and power plants.

The beds are well proportioned and very strong, and are provided with patent pillow-blocks with an improved form of gib to allow for taking up the wear. The gib is adjusted by a set screw tapped through the solid bed, and provided with a ball and socket joint, to allow for perfect adjustment while the engine is running.

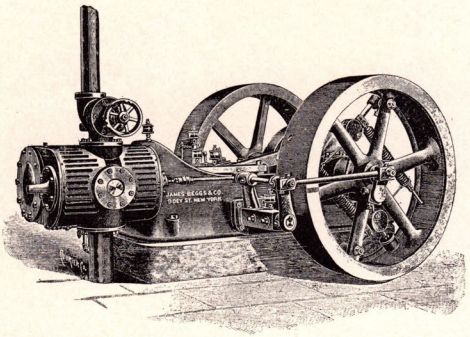
The steam chest is made detachable from the cylinder. The valve is large and simple in its construction, is provided with water grooves for packing, is accurately fitted and perfectly balanced.

The governor is very sensitive and insures close regulation

The rocker is made with a take-up gib on one side, and has two strong arms through which a steel shaft is passed.

The engine is well built and well proportioned throughout, and careful tests prove it to be one of the best high speed engines now on the market.

Every engine is thoroughly tested under steam; the valves adjusted by indicator, and the regulation assured by autograph recording instruments.

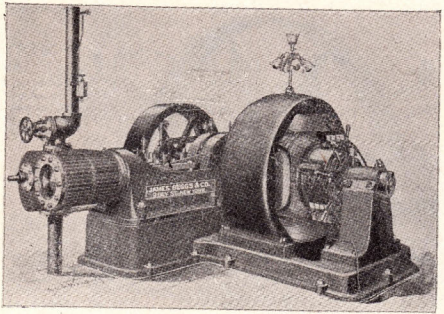


SPECIFICATIONS OF ENGINES.

Number of Size	1	2	3	4	5	6	7	8
Rated Horse Power (at 40 lbs. M. E. P. and ¼ cut-off)	30 to 35	38 to 45	50 to 60	60 to 73	70 to 85	85 to 100	100 to 125	120 to 150
Revolutions per minute	300 to 350	300 to 350	275 to 325	275 to 325	275 to 325	275 to 325	250 to 300	250 to 300
Diameter of Cylinder by Length of Stroke ..... in inches	8×10	9×10	10×12	11×12	12×12	13×12	14×14	15×14
Diameter of Crank-Shaft and Crank-Pin ..... "	3½	3½	4¼	4¼	4½	4½	5½	5½
Diameter of Steam-Pipe ..... "	2½	3	3½	3½	4	4½	5	5
Diameter of Exhaust-Pipe ..... "	3½	3½	4	4½	4½	5	6	6
Floor space occupied ..... "	90×55	90×55	114×66	114×66	114×75	114×75	126×80	126×80
Size of both Band-Wheels, diameter by face ..... "	48×9½	48×9½	64×10¼	54×10½	54×12½	54×12½	60×14½	60×14½
Weight of Band-Wheels in the rough, each ..... in pounds	1,220	1,220	2,100	2,100	2,500	2,500	3,200	3,200
Shipping Weight, in pounds ..... about	5,700	5,800	7,300	7,600	9,900	10,400	14,500	15,000
Engine with Regular Fixtures	$	$	$	$	$	$	$	$

The Regular Fixtures comprise: Nickel-plated Automatic Oiling Device for Crank-Pin and Cross-Head; Nickel-plated Crank Shield; large size continuous Sight-Feed Cylinder Lubricator; full set Sight-Feed Oil Cups; Drip connections from Cylinder and Steam Chest; full set Steel Case-hardened Wrenches; Two heavy Band-Wheels, turned and balanced, per specifications and Throttle-Valve.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.



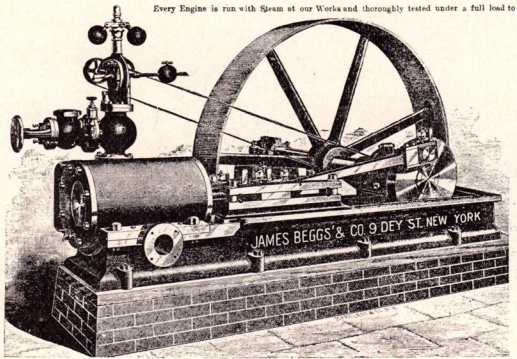
HEAVY DUTY "HIGH SPEED AUTOMATIC" ENGINE,

Especially Adapted for Direct-Connected Electrical Work.

DIMENSIONS AND POWERS.

Number of Size	1	2	3	4	5	6	7	8
Diameter of Cylinder by Length of Stroke	**8x10**	**9x10**	**10x12**	**11x12**	**12x12**	**13x12**	**14x14**	**15x14**
Revolutions per minute	300 to 350	300 to 350	275 to 325	275 to 325	275 to 325	275 to 325	250 to 300	250 to 300
Rated Horse Power (at 40 lbs. M. E. P. and ¼ cut off)	**30 to 35**	**38 to 45**	**50 to 60**	**60 to 73**	**70 to 88**	**85 to 100**	**100 to 125**	**120 to 150**
Diameter of Steam Pipe ... in inches	2½	3	3½	3½	4	4½	5	5
Diameter of Exhaust Pipe ... "	3½	3½	4	4½	4½	5	6	6
Diameter of Shaft and Crank Pin ... "	3½	3½	4½	4½	4½	4½	5½	5½
Size of Pulleys ... "	48x9½	48x9½	54x10½	54x10½	54x13¾	54x13¾	60x14½	60x14½
Weight of Pulleys in the rough, each ... in pounds	1,220	1,220	2,100	2,100	2,500	2,500	2,200	3,200
Floor space occupied ... in inches	90x55	90x55	114x66	114x66	114x75	114x75	126x80	126x80
Weight in pounds ... about	5,700	5 800	7,300	7,600	9 900	10,400	14,500	15,000

Every Engine is run with Steam at our Works and thoroughly tested under a full load to insure reliable working conditions upon arrival at its destination.



STATIONARY ENGINES. WITH BOX BED.

These engines are made with jacketed cylinders, locomotive slides, and steel piston and valve rods and crank pins. The beds are heavy, the wearing surface large, and all working parts are strong and well proportioned. All the fly-wheels and band-wheels are turned and balanced.

In ordering, state whether right or left hand engine is wanted; the engraving shows a left-hand engine.

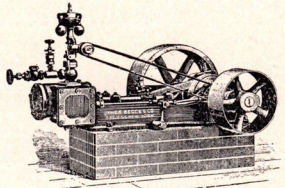
The Regular Fixtures comprise: Continuous Sight-feed Cylinder Lubricator; Oil-Cups; Drips from Cylinder; Improved Governor, with Patent Automatic Safety Stop Attachment (which effectually prevents the running away of engine) and Adjustable Speeder; Throttle-Valve; and Band-Wheel, turned and balanced, per specifications.

This Governor is sensitive and accurate, enabling a close adjustment and superior regulation of speed under varying conditions of load and steam pressure.

SPECIFICATIONS OF BOX-BED STATIONARY ENGINES.—BUILT ONLY TO ORDER.

Number of Size	6	9	11	12	13	14	15
Horse Power, as usually rated	40	55	90	100	125	150	200
Usual Number of Revolutions	150	125	125	125	125	125	125
Diameter of Cylinder by Length of Stroke, in inches	10×20	12×24	14×30	16×24	18×24	20×24	20×30
Diameter of Crank-Shaft, "	4¾	5¾	6¾	7	8	8	8
Diameter of Crank-Pin, "	5	5	5¾	5¾	5	5	5
Diameter by Length of Main Shaft Bearings, "	4¼×9	5¼×12	6¼×15½	6¼×13¼	7×13½	8×15	8×15
Diameter of Steam Pipe, "	3	3½	4	5	5	6	6
Diameter of Exhaust Pipe, "	4	4½	5	6	6	7	7
Length of Bed Frame, in feet	11½	13½	16½	13½	13½	13½	17
Width of Bed Frame, in inches	22	25	29	27½	27½	27½	31
Length of Crank-Shaft from centre of Engine, in feet	7	7	8	8	8	8	8
Size of Band-Wheel, diameter by face	96x15	96x15	120x17	96x17	96x19	96x19	120x21
Shipping Weight, in pounds, about	7,100	10,000	16,000	13,000	14,500	17,000	21,000
Engine with Regular Fixtures	$	$	$	$	$	$	$
FLY-WHEELS AND SMALL BAND-WHEELS FOR ABOVE ENGINES SUBSTITUTED FOR THE REGULAR BAND-WHEELS, WHEN SO ORDERED, AT THE ADDITIONAL PRICE.							
Diameter of Fly-Wheel, in inches	108	110	120	120	120	120	120
Diameter of Small Band-Wheel, "	48	60	60	60	60	60	60
Face of Small Band-Wheel, "	15	15	17	17	19	21	21
Price, additional	$	$	$	$	$	$	$

Every Engine is run with Steam at our Works, and thoroughly tested under a full load, before being shipped, to insure reliable working conditions upon arrival at its destination.



HORIZONTAL, SELF-CONTAINED ("CENTER CRANK ') STEAM ENGINES.

In calling attention to the merits of these Engines, we believe they offer in their present perfection all advantages attainable in Center-crank or self-contained Engines. They are symmetrical and well proportioned, with plenty of metal to insure steady and quiet operation of their rated speed, and present a handsome appearance. They may be relied upon to easily develop the power we claim for them. The Engine, in all respects, is all that good material and workmanship can make it, and is suitable for any purpose requiring small power, from one to seven horse, especially for running small Dynamos for Electric Lighting.

The Frame is designed so as to secure at once strength and proper distribution of metal, with symmetry of shape and beauty, and present the greatest resistance in the line of motion between the Cylinder and Crank-Shaft, and furnishing with itself both of the bearings which are babbitted with the best anti-friction metal, and perfectly square with the other working parts of the Engine.

The Cylinder is jacketed or lagged with metal which is nickel-plated, enclosing an air space, adding to the finish of the Engine and preventing loss of power through radiation. The ports are large and well proportioned, so as to develop the largest amount of power as well as economy in the use of steam. The Valve is of the well-known type of slide valve, and both valve and seat are scraped to a perfect fit.

The Crank-Shaft is made of steel, and is very large, having balanced face plate Crank Disks, nicely finished. The Crank-Pin is made of steel and of ample size to run cool with the heaviest load.

The Connecting-Rod is made of steel, and is fitted with brass boxes of the best mixture for Engine purposes, and is very easily adjusted.

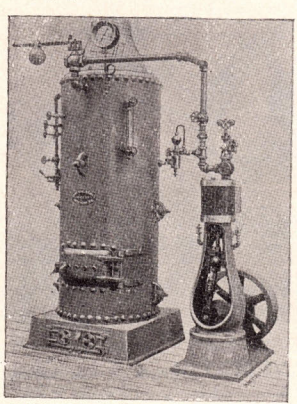
The Cross-Head is made of brass and has a steel Pin turned perfectly round and true. There are two holes parallel with each other that fit the slide, and are easy of adjustment. The Slides are made of round steel, and are fitted in perfect alignment with the Cylinder.

The Piston is made hollow so as not to have any more weight than is absolutely necessary to insure strength and has two metallic packing rings, sprung on the Piston. The Eccentric Valve and Piston-Rods are all of polished steel, making a very fine finish.

Number of Size	1	2	3	4	5	6	7
Horse-Power, as usually rated	1	2	3	4	5	6	7
Usual Number of Revolutions, per minute	55	110	160	220	300	220	260
Diameter of Cylinder by Length of Stroke ... in inches	4x6	4x6	4x6	4x6	4x6	5x6	5x6
Diameter of Steam Pipe ... "	1/2	1/2	1/2	1/2	1/2	1	1
Diameter of Fly-Wheel Pulley ... "	18	18	18	18	18	20	20
Face of Fly-Wheel Pulley ... "	4	4	4	4	4	5	5
Diameter of Crank-Shaft ... "	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4
Shipping Weight, in pounds ... about	425	425	425	425	425	450	450
Engine, with Regular Fixtures	$	$	$	$	$	$	$

The Regular Fixtures comprise: Lubricator; Oil Cups; Drips to Cylinder, for relieving the Engine of water; Governor and Fly-Wheel Pulley of the proper size and weight to insure steady motion.

Every Engine is run with Steam at our Works, and thoroughly tested under a full load before being shipped, to insure reliable working conditions upon arrival at its destination.



"MONTAUK" VERTICAL STEAM ENGINES.

SELF-CONTAINED.

These Engines are of superior construction, being manufactured with great care, from the best materials, and the workmanship is of the best quality, all the parts being fitted in a thorough and workmanlike manner. The steam joints are scraped and ground to a perfect bearing, thus obviating the annoyance of gum or paper joints. The Shaft, Piston-Rod, Valve-Rod and Cross-Head Pin are made of forged steel. The Cross-Head is fitted with composition gibs that are adjustable (to take up the wear). The Piston is fitted with Spring-Rings. All the moving parts are evenly balanced, thus assuring steadiness and smooth running.

These Engines are finely finished, and the parts are made interchangeable, and are easy of access for adjustment or repairs. They are all that good work and good material can possibly make them, to be durable.

These engines are adapted for any manufacturing purpose, and especially where floor space and room are an object. They do not require expensive foundations, and can be placed upon the ordinary floor without annoyance to persons on other floors. Regularity of speed is guaranteed under all variations of load and steam pressure.

SPECIFICATIONS OF ENGINES AND BOILERS, COMBINED.

Horse-Power as Usually Rated.	Size of Cylinder.		Size of Boiler.		Floor Space, Inches.	Weight, Complete.	Price of Engine and Boiler Complete, as Shown
	Diameter, Inches.	Stroke, Inches.	Diameter, Inches.	Height, Feet.			
3	3	4	24	4	24x42	1,500	$
4	4	5	24	5	30x48	1,750	
5	5	6	24	6	38x60	2,700	
6	6	6	30	5	38x60	2,950	
7	6	7	30	5	38x60	3,100	
9	7	7	30	6	45x80	4,300	
10	7	8	30	7	45x80	4,500	

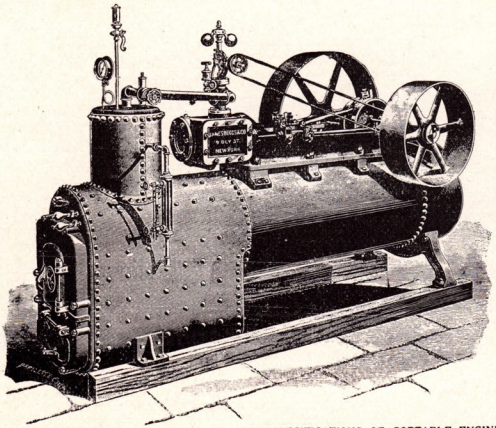
SPECIFICATIONS OF ENGINES, WITHOUT BOILERS.

No. of Size	1	2	3	4	5	6	7	8	9	10	11	12	13
Horse-Power, as usually rated	1	2	3	4	5	6	7	9	10	14	20	25	35
Usual Number of Revolutions, per minute	85	165	250	200	200	180	180	180	170	180	170	180	150
Diameter of Cylinder by Length of Stroke ... in inches	2½x5	2½x5	3x4	4x5	5x6	6x6	6x7	7x7	7x8	8x8	9x9	10x12	12x12
Diameter of Crank-Shaft ... "	1¼	1¼	1½	1½	1⅝	1⅝	1¾	2	2	2	2⅛	3	3½
Diameter of Steam-Pipe ... "	¾	¾	¾	1	1	1¼	1¼	1¼	1¼	1¼	1¼	2½	3
Diameter of Exhaust-Pipe ... "	1	1	1	1	1¼	1½	1½	2	2	2	2½	3	3½
Floor Space ... "	14x24	14x24	14x24	16x28	20x36	20x36	20x36	22x39	22x39	25x45	31x55	36x60	36x90
Height ... "	37	37	37	44	54	54	57	63	63	68	78	86	88
Size of Fly-Wheel Pulley, diameter by face ... "	18x3½	18x3½	18x3½	20x4	24x5	24x5½	28x5½	32x6	32x6	34x8	38x10	42x10	42x12
Shipping Weight, in pounds ... about	285	300	325	400	700	850	900	1,600	1,700	1,800	2,700	4,000	4,400
Engine, with Regular Fixtures ... $	$		$140	$166	$196	$208	$218	$265	$285	$330	$450	$580	$670

The Regular Fixtures comprise: Continuous Sight-feet Cylinder Lubricator; Oil-Cups; Drips to Cylinder: Governor, and Fly-Wheel Pulley.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

A Low Water Detector and Alarm is fitted to each boiler. This appliance is reliable, extremely simple, and cannot be tampered with when the boiler is in operation. It is a means of preventing costly damage to boiler when the water becomes dangerously low, by allowing the steam to escape and give alarm; so permanent injury is prevented, and the boiler may be left in good condition. This style of Detector has been approved by the United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D. C., and is required by them on all boilers under their control.



PORTABLE ENGINES.

Full specifications of the Engine will be found on pages 4 and 5, and of the Boiler on page 25.

The price of Portable Engine includes Injector, fitted to Boiler, and balance of regular fixtures for both Engine and Boiler.

Nos. 8 and 9, Portable Engines, have an additional stand for supporting the shell of the Boiler.

All these Engines can be taken off the Boiler and placed on an independent foundation, with no other change than the additional lengths of pipe required—See page 14.

When these Engines are ordered mounted on wheels the Tongue is furnished; but the Neck-yoke, Evener, Whiffletrees, Hand-Pump and Brake are subject to order, and are charged extra.

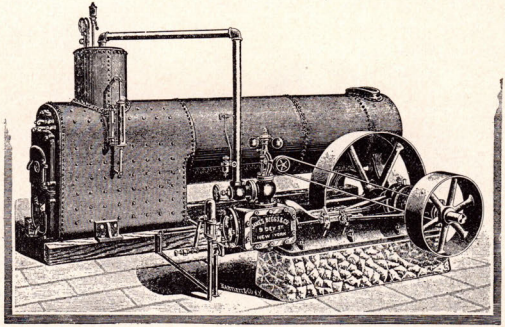
For Engines mounted on wheels a short Stack, with Hinge and Spark Arrester, can be substituted for the regular Stack, without change in price; but unless otherwise ordered, we send the regular Stack.

SPECIFICATIONS OF PORTABLE ENGINES.

Number of Size	1	2	3	4	5	6	7	8	9
Horse-Power, as usually rated	8	10	12	15	20	25	35	40	50
Usual number of revolutions	200	175	175	150	150	150	150	150	150
Diameter of Cylinder by Length of Stroke ..... in inches	6x9	7x10	8x10	8x12	9x12	10x12	10x15	11x15	12x16
Diameter of Boiler ..... "	28	30	32	32	34	36	40	40	44
Weight complete, in pounds ..... about	5,000	6,000	6,400	7,000	9,200	10,500	13,500	15,000	18,500
Price	$	$	$	$	$	$	$	$	$

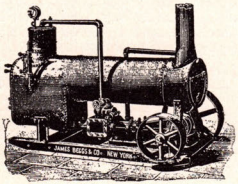
Every Engine is run with Steam at our Works, and thoroughly tested under a full load, to insure reliable working conditions upon arrival at its destination.

Every Engine and Boiler is thoroughly tested under Steam at our Works before being shipped, to insure reliable working conditions upon arrival at its destination.



"WATER-BOTTOM" PORTABLE BOILER, AND SELF-CONTAINED ("CENTER-CRANK") ENGINE.

WITH CONNECTING STEAM AND WATER PIPES.



UNDER-MOUNTED PORTABLE ENGINE.

The Engines can be set on an independent foundation, as shown above, and connected to any style of boiler—"Portable," "Stationary" or "Vertical."

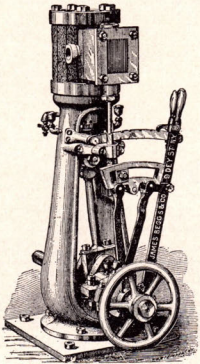
A Low Water Detector and Alarm is fitted to each boiler. This appliance is reliable, extremely simple, and cannot be tampered with when the boiler is in operation. It is a means of preventing costly damage to boiler when the water becomes dangerously low, by allowing the steam to escape and give alarm; so permanent injury is prevented and the boiler may be left in good condition. This style of DETECTOR has been approved by the United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D. C., and is required by them on all boilers under their control.

Every Engine is run with Steam at our Works and thoroughly tested under a full load, before being shipped, to insure reliable working conditions upon arrival at its destination.

STEAM LAUNCH ENGINE.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

This engraving represents our Marine Engine, which is adapted to furnishing power in pleasure yachts, tug-boats, canal and other steam vessels. The frames of these engines are graceful, compact and strong, with easy access to all the wearing parts, and the construction of the Engine is such that the action of the piston-rod is exactly central, and all overhanging strains and unevenness of wear are avoided. The bearings are large, and are cast on the frame, as are also guides, and there can be no derangement of the parts or unequal pressure of the same. These Engines are furnished with the link motion, for reversing, and are provided with notches for working expansively, and are justly claimed to combine, theoretically and practically, all the requirements of engines of this character. A plain slide valve is used, and all the steam joints are ground, thus dispensing with the annoyance of rubber or gum packing. The Shaft, Piston-Rod, Valve-Rod and Cross-head Pin are of Steel, and the Connecting-Rod of the best refined iron.



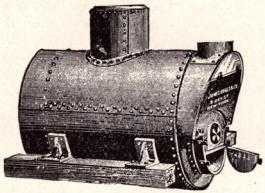
The Cylinder has a grooved and tongued black walnut jacket, to prevent condensation, which also gives it a beautiful appearance. All the wearing parts are provided with proper adjustments to take up the wear. A critical steam test of every Engine is made before it leaves the shop, and all necessary adjustments are carefully made, so that when shipped it is all ready for work. It is very simple and easily understood, and can be managed by any one of ordinary intelligence. The sizes range from 3¼ x 5 to 12 x 12. We furnish an eccentric pump at a small additional cost. Every Engine is furnished with a Fry-over Wheel, Cylinder Lubricator, Drip Cocks, Oil Cups, Wrenches, etc., ready to place in boat. Every Engine warranted first-class.

Price of Shafting, Propeller and other machinery furnished on application.

SPECIFICATIONS OF YACHT ENGINES.

Number of Size	1	2	3	4	5	6	7	8	9	10	11	12
Horse-Power, as usually rated	3 to 5	4 to 6	5 to 8	6 to 9	7 to 10	10 to 14	12 to 16	15 to 20	18 to 25	25 to 30	35 to 40	45 to 50
Usual number of revolutions, per minute	300	300	275	275	275	250	225	225	200	175	175	175
Diameter of Cylinder by Length of Stroke, in inches	3½x5	3½x5	4x6	5x6	5½x6.	7x7	7½x8	8x8	9x9	10x12	11x12	12x12
Height from Floor to top of Cylinder "	38	39	42	42	43	55	57	58	63	80	80	81
Weight, complete, in pounds about	300	325	400	425	450	700	1,075	1,175	1,350	2,500	3,000	3,500
Price of Engine	$	$	$	$	$	$	$	$	$	$	$	$

These Boilers are designed (unless otherwise specified) to carry a working pressure of 100 pounds of steam to the square inch, and are subjected to a thorough test by us, before delivery, under a steam pressure of about 120 pounds. They are carefully inspected by the Hartford Steam Boiler Inspection and Insurance Co., and tested by (warmed) water pressure to the extent of 150 pounds per square inch without developing any weakness or defects, and insured by them for one year. The certificate of inspection and test, signed by the Company's Inspector, also policy of insurance, will be furnished customer free of charge. This policy is payable to the purchaser, and will be in force and valid wherever the boiler is located.



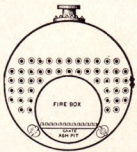
THE CLYDE BOILER.—Probably no form of horizontal boiler used in launches combines in so great a degree, strength, compactness and low centre of gravity as the form of boiler illustrated herewith, which we call the "Clyde" boiler.

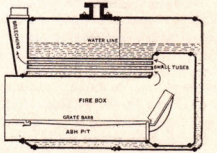
As will be seen by the engraving, all the surfaces of the fire-box and the shell of the boiler are cylindrical, this being the strongest form in which the material can be put together. The fire-grate is placed in the large central tube, and the fire is entirely surrounded by water. The "Clyde" is a return flue boiler. The fire passes through the large central tube into a lined combustion chamber at the rear of the boiler, and returns through the smaller tubes to the smoke bonnet at the front end of the boiler, thence into the funnel, thus giving the greatest possible economy in the use of fuel. The tubes are at all times below the water line.

Diameter. Inches.	Length. Inches.	Diameter, Furnace. Inches.	Square Feet Heating Surface.	Suitable For Engine Cylinder.	Price with Regular Fixtures.
40	50	18	90	5x 7	$
44	56	20	115	6x 8	
46	68	22	185	7x 8	
48	72	24	185	8x 8	
54	72	26	230	8x10	
54	84	26	285	9x 9	
60	84	28	325	10x10	
60	96	28	400	10x12	
72	96	30	500	12x12	

The Regular Fixtures comprise: Steam-Gauge, Water-Gauge, Gauge-Cocks, Safety-Valve, Blow-Off Cock, Grate-Bars, Smoke-Stack and Breeching.

Boilers of this style smaller than we list are objectionable because the furnace is too small.





SCOTCH MARINE BOILERS (with Water-Backs).—In large boats, where economy of fuel has to be considered, or where the boat is desired for long trips, and the weight of fuel to be carried is an object of consideration, we would recommend the form of Scotch boiler of which we show outlines, which is built with a water-back. The cost of these boilers is considerably in excess of the other type ("Clyde") and in small launches the saving in fuel will not warrant the extra expense.

All material and work conforming to U. S. Marine laws for *high-pressure* steam, with fittings to correspond in quality and service.

The Regular Fixtures comprise:—Breeching, Grate-Bars, Smoke-Stack, Steam-Gauge, Water-Gauge, Gauge-Cocks, Safety-Valve and Blow-Off Cock.

Shell. Diameter.	Shell. Length.	Square Feet Heating Surface.	Approximate Weight all Complete.	Price with Regular Fixtures.
50	72	185	4,650	$
50	84	230	5,100	
54	72	240	5,350	
60	72	303	7,000	
60	84	320	7,500	
60	96	375	8,500	
66	72	400	8,500	
72	96	530	12,700	
72	108	600	13,800	
78	108	825	16,000	

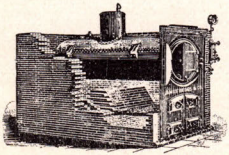
Orders for marine boilers should always contain the following information:

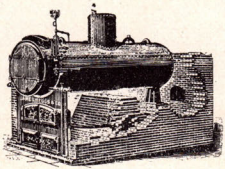
1. Location and name of waters on which boat is to run.
2. Kind of fuel to be used.
3. All orders for marine boilers must be accompanied by the name of the boat in which the boiler is to be placed and also, where practicable, the hailing port.

A Low Water Detector and Alarm is fitted to each Boiler. This appliance is reliable, extremely simple, and cannot be tampered with when the boiler is in operation. It is a means of preventing costly damage to boiler, when the water becomes dangerously low, by allowing the steam to escape and give alarm, so permanent injury is prevented, and the boiler may be left in good condition. This style of Detector has been approved by the **United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D. C.,** and is required by them on all boilers under their control.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

A Low Water Detector and Alarm is fitted to each boiler. This appliance is reliable, extremely simple, and cannot be tampered with when the boiler is in operation. It is a means of preventing costly damage to boiler when the water becomes dangerously low, by allowing the steam to escape and give alarm; so permanent injury is prevented and the boiler may be left in good condition. This style of **Detector** has been approved by the United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D. C., and is required by them on all boilers under their control.





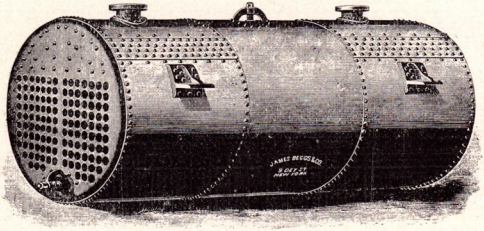
We use lap-welded boiler tubes **of standard thickness and quality.** The tubes are set with a "Dudgeon" expander in vertical and horizontal rows, spaced 1 inch apart, and the ends of tubes project beyond heads of boiler about one-quarter inch, and are "flared" but not headed over.

No. 10 and larger boilers have a circulating space of 2 or more inches left, vertically, through center line of tubes; and no tubes are nearer the shell than 2 inches, and at bottom of boiler tubes are not less than 8 inches from the shell.

A cast iron neck is securely riveted to top of each boiler, with opening for pipe of suitable size.

No. 9 and smaller boilers have manhole formed in front head, above tube line. All larger sizes have manhole in top of shell.

Our side lugs are extra large size, with heavy rib through center line; and are firmly secured to boiler.



Provision is made on each of these boilers for attaching the most approved system of "feed" and "blow-offs.

These Boilers are designed (unless otherwise specified) to carry a working pressure of 100 pounds of steam to the square inch, and are subjected to a thorough test by us, before delivery under a steam pressure of about 120 pounds. They are carefully inspected by the Hartford Steam Boiler Inspection and Insurance Co., and tested by (warmed) water pressure to the extent of 150 pounds per square inch without developing any weakness or defects, and then for one year, The certificate of inspection and test, signed by the Company's Inspector, also policy of Insurance, will be furnished customer free of charge. This policy is payable to the purchaser, and will be in force and valid wherever the boiler is located.

HORIZONTAL RETURN-TUBULAR STATIONARY STEAM BOILERS.

Our Boilers are made throughout of Open-hearth Homogeneous "FLANGE" Steel Plate, of 60,000 pounds tensile strength, with an elastic limit of over 30,000 pounds, elongation of over 20 per cent., and reduction of area of 45 to 50 per cent. This steel will turn over and close down solid without fracture, when cold, or after heating, and cooling in water, and will not blister. The shells of Nos. 1, 2, 3 and 4 are formed of a single plate; Nos. 3½, 5, and larger sizes, up to and including No. 15, have one plate in the bottom and one in the top. In all sizes up to and including No. 15, the bottom of boiler will be without seams, except around the heads. The great advantages of a boiler made in this way are apparent; there are no seams over the fire, and the bottom presents a smooth, even surface, which greatly facilitates cleaning, prevents lodgment of sediment, and consequent burning of plates. The longitudinal seams of the Shell are double-riveted, with calking edge looking upwards. The rivets are spaced in accordance with the most approved rules, and the greatest possible strength incurred at the seams. The edges of the plates are planed and the calking is done by Connery's patent concave system. Special attention is given to the bracing, which is a most important item in boiler construction. All our boilers up to and including No. 3½, are braced with solid stay-rods running from head to head, screwed in plates and riveted over on outside of head. All larger boilers are braced throughout with solid "crow-foot" braces. All stay-rods and braces are made of a special refined iron of 50,000 pounds tensile strength, and enough braces are used to insure a large factor of safety. Care is used in locating braces that they do not come in way of entering boiler, or of feed and blow-off pipes which enter through top of shell.

SPECIFICATIONS OF BOILERS.

Number of Size	1	2	3	3½	4	5	6	7	7½	8	9	10	10½	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Horse Power, as usually rated	10	12	15	20	20	25	30	35	40	40	45	50	60	60	70	80	90	100	125	150	175	200	225	250	300	325	350
Diameter of Boiler...inches	30	30	36	36	42	42	44	44	44	48	48	54	54	60	60	60	66	66	72	72	78	84	90	96	102	108	108
Length of Tubes ..in feet	7	8	8	8	8	10	10	12	14	12	14	12	14	16	15	16	16	18	18	18	18	18	18	18	18	18	20
Number of Tubes 3-in. diameter	20	20	28	28	38	46	46	46	52	52	64	64	82	82	82	98	98	120	74	84	88	108	132	150	166	190	190
Square Feet Heating Surface.....about	151	185	220	288	305	376	440	526	611	591	687	768	880	985	1028	1172	1296	1377	1660	4 ths	4 ths	4 ths	4 ths	4 ths	4 ths	4 ths	4 ths
Length of Grates...inches	36	36	36	42	36	42	42	48	54	48	54	54	48	54	54	54	54	54	60	60	60	60	60	72	72	72	78	84
Thickness of Shell..."	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Main Heads..."	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Weight of Boiler and Breeching.....about	1900	2300	2600	2900	3500	4000	4300	4900	5500	6000	6800	7000	8200	9000	9900	11000	12700	13000	16000	17300	21000	25000	30000	32000	36000	39000	41000
Weight of Boiler Fixtures..."	1500	1600	1700	1950	2200	2500	2600	2700	3000	3400	3500	3600	3800	4000	4500	5000	5000	5000	6000	6200	7000	8000	9000	10000	11000	12000	12000
Weight of Boiler and Fixtures.....about	3400	3900	4300	4850	5700	6500	6900	7600	8500	9400	10300	10600	12000	13000	14400	16000	17700	18000	22000	23500	28000	33000	39000	42000	47000	51000	53000
Weight of Boiler with 6 Wall Brackets...about	1900	2300	2600	2900	3500	4000	4300	4900	5500	6000	6800	7000	8200	9000	9900	11000	12700	13000	16000	17400	21000	24700					
Weight with Flush Front and Fixtures..about	4400	4900	5300	5800	7000	7700	8400	9000	10000	10900	11500	12900	13500	14500	16000	17700	19000	20000	24000	25900	30000	35000					
Boiler, with Regular Fixtures.....	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$

The Regular Fixtures comprise: Arch Front of neat design, with two furnace doors provided with cast-iron perforated lining plates; Dead Plate; Anchor Bolts, to hold the front to mason work; Door with Frame, for cleaning boiler at rear end of smoke-stack; Plates and Rollers, for lugs to ride on in side walls of mason work; Grate Bars, with suitable Bearer; Heavy Ribbed Back-stays, for binding side walls of mason work, and Anchor Bolts, running across top and bottom, with Nuts and Washers for same; Bar, for supporting top of arch against rear end of boiler; Safety-Valve; Gauge-Cocks; Steam Gauge; and Gauge-Glass, with Water-Column and blow-off cock.

The width of the grate surface in all cases equals the diameter of the boiler. Short grates, six inches longer than regular, will be substituted for the regular grates, when ordered, without extra charge.

SMOKESTACKS FOR ABOVE BOILERS FURNISHED, WHEN SO ORDERED, AT ADDITIONAL PRICE.

Diameter of Smokestack...inches	14	14	16	16	20	22	22	24	24	26	26	28	28	28	30	30	30	34	36	40	44	48	50	54	56	56
Length of Smokestack...in feet	28	28	28	35	28	35	35	40	50	40	50	40	50	40	50	60	60	60	60	60	60	60	60	60	60	60
Price of Smokestack	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$

All Smokestacks up to and including 28 inches in diameter are made of No. 16 iron; 30, 32 and 34 inches in diameter of No. 14, and 36 inches and larger of No. 12. If heavier iron is required a proportionate charge will be made.

When two or more boilers, up to No. 7½ in size, are placed in a battery and designed to run separately, the fronts, smoke-connection, etc., are arranged for a 16-inch division wall; boilers up to No. 10½, 20-inch, and larger sizes 24-inch division wall. Any deviation from this must be noted in order.

CHANGE IN NUMBER AND SIZE OF TUBES WITHOUT CHANGE IN PRICE.

Number of Size	1	2	3	3½	4	5	6	7	7½	8	9	10	10½	11	12	13	14	15	16	17	18	19	20	21	22	23	24
No. of 3-in. Tubes, with Hand-hole in each Head below tubes	20	20	28	28	38	46	46	46	52	52	64	64	82	82	82	98	98	120									
" 3 " " Manhole in front				20	20	30	30	40	40	40	46	46	58	58	78	78	78	94	94	116							
" 3½ " " Handhole in each			16	22	22	30	36	36	36	42	42	50	50	64	64	64	78	78	96	104							
" 3½ " " Manhole in front				18	18	26	26	32	32	32	38	40	46	48	60	60	60	76	76	94	100						
" 4 " " Handhole in each	12	12	18	18	24	24	30	30	30	34	34	42	42	54	54	54	64	64	80	84							
" 4 " " Manhole in front				14	14	20	20	26	26	26	30	30	38	38	52	52	52	58	58	78	80	88	108	132	150	166	190	190
" 6 " "					6	6	10	10	10	10	14	14	18	18	22	22	22	30	30	36	36	40	44	62	74	78	92	92

A Low Water Detector and Alarm is fitted to each Boiler. This appliance is reliable, extremely simple, and cannot be tampered with when boiler is in operation. It is a means of preventing costly damage to boiler, when the water becomes dangerously low, by allowing the steam to escape and give alarm, so permanent injury is prevented, and the boiler may be left in good condition. This style of **Detector** has been approved by the **United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D.C.,** and is required by them on all boilers under their control.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

SMOKE CONNECTIONS.

Fig. C, for two boilers only.

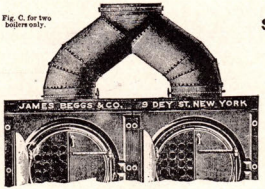
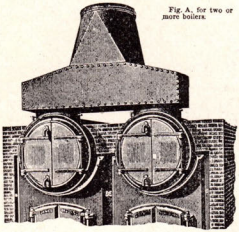


Fig. A, for two or more boilers.



CONNECTIONS FOR BOILERS

up to and including 48 inches in diameter are made of No. 14 Iron, larger sizes of No. 12 Iron.

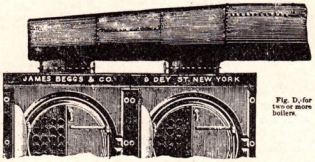
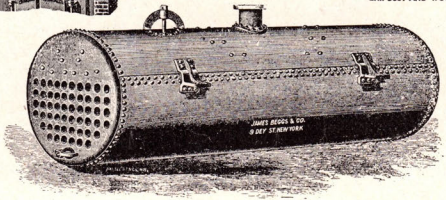


Fig. D, for two or more boilers.

PLAIN GRATE
(STANDARD PATTERN)
With ¼, ½ and ¾ inch opening.

HERRING-BONE GRATE
With ½-inch opening only

SAW-DUST AND WOOD GRATE

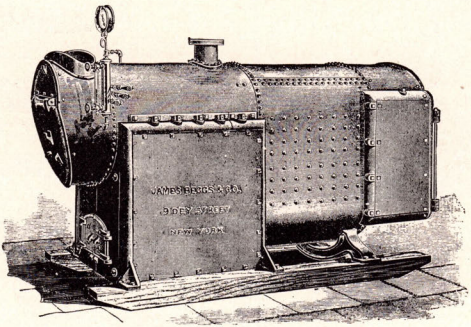


OUR "DIRECT-RETURN" OR IMPROVED "HORIZONTAL RETURN-TUBULAR" STEAM BOILER,

FITTED WITH

THE BEST AND MOST ENDURING GRATE BARS EVER PLACED UPON THE MARKET.

These bars will clean fires from the bottom without opening the fire doors. This boiler is an absolute success in burning the cheapest grades of Coal, such as Bituminous "Run-of-the-Mine" and "Slack," Anthracite "Pea," "Buckwheat," "Birdseye," and Coal Yard Screenings (coal dirt); as well as all the high grades of Bituminous, Anthracite "Lump," "Furnace," "Egg," "Stove" and "Chestnut" Coals, and it may be used equally well for burning sawdust, straw, shavings, etc.



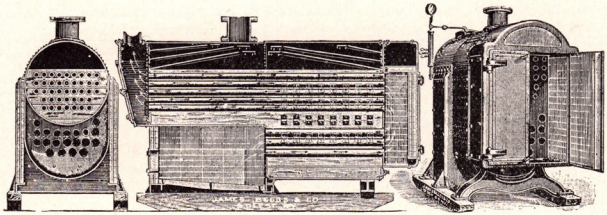
ON SKIDS READY FOR SHIPMENT.

It occupies less space than other shell boilers, of equal capacity, as, for example: the "Horizonal Return-Tubular," the "Locomotive" and others.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

OUR "DIRECT-RETURN" OR IMPROVED "HORIZONTAL RETURN-TUBULAR" STEAM BOILER.

SECTIONAL VIEW.



JAMES BEGGS & CO., NO 9 DEY STREET, NEW YORK.

THIS boiler can be easily inspected, both inside and out, as all parts may be reached without difficulty. The rear doors expose the back head with all the ends of the tubes. The doors in the smokebox, underneath the smokestack, afford access to the front ends of long tubes, for cleaning; while underneath them is a handhole which permits an examination of the shell of the boiler, over the furnace, and by introducing a scraper and hose, any deposit of sediment, caused by the use of impure water, that may lodge underneath the tubes, may be washed backward and into the lower part, where it will pass off through the blow-off, or may be removed through the two handholes at either side or through the single handhole underneath the back connection—there being four handholes in all.

All floating matter is removed from the surface of the water by means of a simple, special apparatus attached to our boiler.

A Manhole is placed in front head over the tubes, so that the braces may be examined, as well as the tubes. It will be observed from the engravings that **there are no "water legs"** to this boiler. **The sides of the furnace are lined with fire bricks,** as also is the front end of the furnace. The combustion chamber at the rear end is also lined with fire bricks.

Pressure: These boilers are designed (unless otherwise specified) to carry a working pressure of 100 pounds of steam to the square inch.

Test: They are subjected to a thorough test by us, before delivery, under a steam pressure of about 120 pounds.

Inspection and Insurance: They are carefully inspected by the Hartford Steam Boiler Inspection and Insurance Company, and tested by (warmed) water pressure to the extent of 150 pounds to the square inch without developing any weakness or defects, and insured by them for one year. The certificate of inspection and test, signed by the Company's Inspector, also Policy of Insurance, will be furnished customers free of charge. This policy is payable to the purchaser, and will be in force and valid wherever the boiler is located.

SPECIFICATIONS OF OUR "DIRECT-RETURN" BOILERS.

MADE OF HOMOGENEOUS OPEN-HEARTH STEEL PLATE, AND THOROUGHLY BRACED THROUGHOUT.

Number of Size	2	3	4	5	6	7	7½	8	9	10	11	12	13	14
Horse-Power, as usually rated	10	12	15	20	25	30	35	40	50	60	70	80	90	100
Diameter of Boiler...in inches	28	28	30	30	36	36	40	40	44	50	54	54	60	60
Length of Furnace, inside (about)... "	35	35	38	44	44	44	53	53	53	60	60	60	60	66
Width " " (")... "	28	28	30	30	36	36	40	40	44	50	54	54	60	60
Number of 3-inch tubes (")	16	16	21	21	30	30	38	38	52	64	78	78	88	88
Length " " used...in feet	6	7	7	8½	8	9	9	10	9½	9½	9	10	9½	11
Number of 4-inch tubes...(about)	10	10	12	12	18	18	20	20	26	32	42	42	46	46
Length " " used (")...in inches	35	46	43	55	49	61	52	64	58	54	48	60	54	66
Thickness of Shell... "	9-64	No. 4	¼	¼	¼	¼	¼	⅜	⅜	⅜	⅜	⅜	11/32	11/32
Thickness of Tube Sheets... "	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜
Length of Boiler, over all, in feet...about	9½	10½	10½	12	11½	12½	13	14	13½	13½	13	13½	13½	15½
Width " " " ... "	4	4	4	4	4½	4½	5	5	5½	6	6½	6½	7	7
Height " " " ... "	5½	5½	6	5½	6	6½	6½	7½	8	8½	8½	9	9	9
Weight of Boiler...about	4,500	4,750	6,000	6,450	7,800	8,400	9,200	10,100	11,800	14,100	17,000	17,800	20,800	22,500
Weight of Fixtures... "	700	750	750	1,000	1,100	1,200	1,500	1,700	1,900	2,100	2,300	2,400	2,700	3,000
Weight of Boiler and Fixtures...about	5,200	5,500	6,750	7,450	8,900	9,600	10,700	12,000	13,700	16,200	19,300	20,300	23,500	25,500
Boiler with regular Fixtures	$	$	$	$	$	$	$	$	$	$	$	$	$	$

The Regular Fixtures comprise: Grates, Steam-Gauge, Gauge-Glass, Gauge-Cocks, Safety-Valve and Blow-off Cock. A Water-Column, in connection with the gauge-glass, is furnished with each boiler. The height of water can thus be determined with greater certainty and ease, and the chances of accident are lessened.

The Furnace is fitted with McClave's Patent Grate-Bars, and the grate surface is very much larger in proportion to the heating surface than any other Boiler of this type—thus permitting the use of a very cheap grade of coal. ☞ See pages 36 to 43. ☜ **We have evidence which proves these grate-bars the very best for all-around work and all kinds of fuel.**

SMOKESTACKS FOR ABOVE BOILERS FURNISHED, WHEN SO ORDERED, AT THE ADDITIONAL PRICE.

Diameter of Stack	12	12	14	14	18	18	20	20	22	24	28	28	30	30
Length of Stack	30	35	35	40	40	45	45	50	50	50	45	50	50	60
Price of Stack	$	$	$	$	$	$	$	$	$	$	$	$	$	$

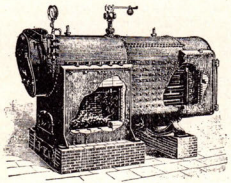
All smokestacks up to and including 28-inch diameter are made of No. 16 iron, and larger sizes of No. 14; if heavier is required a proportionate charge will be made.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK

MORE THAN 25,000 BOILERS AND 12,000 ENGINES, OF OUR MAKE, ARE IN USE.

OUR "DIRECT-RETURN" OR IMPROVED "HORIZONTAL RETURN-TUBULAR" STEAM BOILER.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.



SET UP READY FOR USE.

Instead of a bridge wall, with an open space behind it, as shown in the engravings on page 17, we extend the shell of this boiler downward and insert 4-inch tubes, passing through the water space. Thus we utilize as heating surface an unused portion of the average setting of the "Horizontal Return-Tubular" Boiler.

REASONS WHY OUR "DIRECT-RETURN" OR IMPROVED "HORIZONTAL RETURN-TUBULAR" BOILER IS THE BEST FORM OF BOILER OF THIS TYPE THAT IS MADE.

It may be argued by some that rejecting the "water-leg" is a detriment. By "water-leg" we mean the sides of the furnace as well as the ends, which usually form a part of the "locomotive" boiler, being made of two flat plates secured together by stay bolts with 3 inches to 4 inches of water space between them, depending upon the size of the boiler.

This "water-leg" has been the source of an immense amount of expense and annoyance. For, when these stay bolts in a "water-leg" once begin to break, and the bottom part begins to leak through corrosion, it will be found that continual repairs are necessary, which finally end in cutting off the "leg" and putting on a new one, or, as a substitute, a large patch. Some very serious recorded explosions have occurred through the breaking of the stay bolts at the sides of furnaces with "water-legs." And as a measure of economy, the "water-leg" is not a success; besides, with bad water it is soon filled with mud, which frequently bakes on to the plate towards the furnace and there blisters or burns through, and even in those cases where it is kept clean, these "water-legs" cannot take the high temperature which is communicated to the fire-bricks in our boiler. This high temperature has the effect of bringing about an almost perfect combustion of the gases in the furnace, and as the surfaces are red hot, they support combustion by keeping up the high temperature of the gases, without which they would pass off unconsumed.

The same reasoning obtains to a lesser degree to the back connection, where the brick lining assumes and holds a high temperature, so that through this arrangement we get the most flattering results in the way of economy of fuel in this boiler.

IT WILL DO AS MUCH WORK

as any **plain** "Horizontal Return-Tubular," **of equal rated capacity,** with a great deal less fuel—by actual test in some instances of 25 per cent., which is a very remarkable showing. It is a more rapid steamer, and combines all of the advantages of the **plain** Tubular, without the necessity of bricking in. A suitable ashpit and foundation-pier for supporting the **Improved** boiler, as shown on previous page, is all the mason work required.

As will readily be seen, the "Direct-Return" is supported entirely from the bottom, thus obviating the consequent dangerous strains which occur in the shells of the boilers carelessly set in brick-work or within unstable foundation walls. This boiler is tremendously strong both in design and construction, and it would be next to impossible to strain it by setting upon a poor foundation.

WORKMANSHIP.

The tubes are set with a "Dudgeon" Expander.

All girth seams are single riveted. All horizontal seams of the shells of No. 6 and larger sizes are double riveted.

All rivets are of proper size and pitch of holes, for thickness of material used, and of best quality, and of sufficient length to form up heads equal in strength to the pressed heads of same, in accordance with the most approved rules, securing the greatest possible strength at seams.

These Boilers are thoroughly braced with braces made of a special refined iron, of a tensile strength of 50,000 pounds, and enough braces are used to insure a large factor of safety. Edges of all plates are planed to a bevel, and finished ready for calking, before rolling to shape.

Seams are chipped and calked thoroughly. All calking is done with a "Connery Patent" round-nosed calking tool. No drift pins are used to "fair-up" holes in construction of boiler; a reamer is used for this purpose wherever required

All flanges are properly turned and free from flaws, checks or other defects.

The whole is put together in a first-class workmanlike manner; materials used are the best of their several kinds. Our shops are equipped with the latest and most approved machinery, and the work from beginning to end is done after a thorough system, which enables us to make the best boilers at the lowest prices consistent with good work. Powerful steam cranes are employed for lifting and carrying the heavy plates through the shops, and for loading the completed boilers; this insures careful handling.

PRESSURE—These boilers are designed (unless otherwise specified) to carry a working pressure of 100 pounds of steam to the square inch.

TEST—They are subjected to a thorough test by us, before delivery, under a steam pressure of about 120 pounds.

INSPECTION AND INSURANCE—They are carefully inspected by the Hartford Steam Boiler Inspection and Insurance Company, and tested by (warmed) water pressure to the extent of 150 pounds per square inch without developing any weakness or defects, and insured by them for one year. The certificate of inspection and test signed by the Company's Inspector, also Policy of Insurance, will be furnished free of charge.

The Furnace is fitted with McClave's Patent Grate-Bars, and the grate surface is very much larger in proportion to the heating surface than any other Boiler of this type—thus permitting the use of a very cheap grade of coal. **See pages 36 to 43.** **We have evidence which proves these grate-bars the very best for all-around work and all kinds of fuel.**

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

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PORTABLE BOILERS,

WITH "WATER BOTTOM."

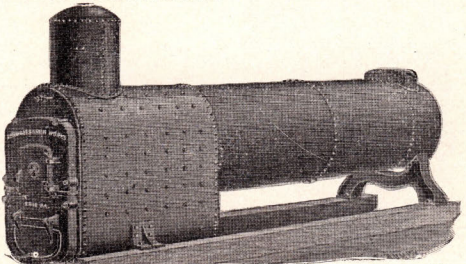
The favorite "Water Bottom" style, made of open-hearth homogeneous steel plate and thoroughly braced and stayed throughout. The longitudinal seams of the shells of No. 6, and all larger sizes, are double riveted.

The regular Fixtures comprise: Grates; Steam-Gauge; Water-Gauge; Gauge-Cocks; Safety-Valve; Blow-off Cock; and Smoke-stack. All smokestacks are made of No. 16 iron; if heavier is required, a proportionate charge will be made.

When order calls for boiler mounted on wheels, as shown on fourth page of cover, the tongue is furnished; but the neck-yoke, evener, whiffletrees, hand-pump and brake are subject to order, and are charged extra.

Note.—When these boilers are made with water-front, as shown on third page of cover, the furnace is about three inches shorter. Water front boilers are made on special order only, and at an extra price.

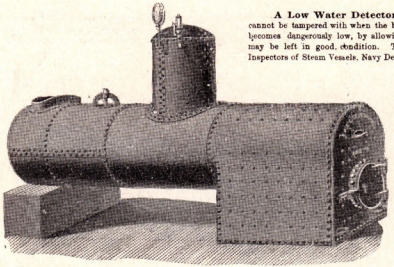
The short stack, with hinge and spark arrester, can be substituted for the regular stack without change in price; but unless otherwise ordered, we send the regular straight stack.



SPECIFICATIONS OF PORTABLE BOILERS WITH "WATER BOTTOM."

Number of Size	0	1	2	3	4	5	6	7	8	9	10
Horse Power, as usually rated	6	8	10	12	15	20	25	30	35	40	50	60
Diameter of Boiler ..in inches	26	28	30	32	32	34	36	40	40	40	44	48
Length of Furnace (see note above) "	34	36	38	38	44	52	52	60	60	60	64	64
Width of Furnace "	21	22	24	26	24	28	30	34	34	34	38	42
Height of Furnace "	29	33	35	35	36	37	40	43	43	43	50	52
Number of Tubes (3-inch diameter)	15	18	20	24	24	28	32	38	40	40	46	52
Length of Tubes used ..in feet	6	6	7	6½	7	8	8½	8	9	10½	11½	12
Thickness of Shell and Outside of Fire-Box..in inches	No. 4	No. 4	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Furnace Plate "	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Tube Sheets "	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Diameter of Dome "	12	14	16	18	18	20	20	22	22	22	22	24
Height of Dome "	15	16	18	20	20	22	22	24	24	24	24	28
Diameter of Stack "	12	14	14	16	16	16	18	20	20	20	22	22
Length of Stack ..in feet	12	12	12	12	12	12	12	12	12	12	12	12
Length of Boiler over all, in feet ..about	9½	11	12	11½	13	14½	15	15	16	17½	19½	20
Weight of Boiler, on skids ..about	2,600	3,150	3,550	3,900	4,150	5,100	5,900	7,000	7,450	7,950	9,900	11,200
Weight of Boiler Fixtures "	450	500	550	600	650	950	1,000	1,150	1,300	1,350	1,500	1,700
Weight of Boiler and Fixtures, complete, on skids ..about	3,050	3,650	4,200	4,500	4,800	6,050	6,900	8,150	8,700	9,300	11,400	13,000
Weight of Boiler and Fixtures, complete, on wheels ..about	3,500	4,100	4,700	5,000	5,300	6,600	7,500	8,700	9,300	9,900	12,000	13,700
Boiler, with Regular Fixtures ..$	$	$	$	$	$	$	$	$	$	$	$	$

A Low Water Detector and Alarm is fitted to each Boiler. This appliance is reliable, extremely simple, and cannot be tampered with when the boiler is in operation. It is a means of preventing costly damage to boiler, when the water becomes dangerously low, by allowing the steam to escape and give alarm, so permanent injury is prevented, and the boiler may be left in good condition. This style of Detector has been approved by the **United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D. C.**, and is required by them on all boilers under their control.



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PORTABLE BOILERS.

These boilers are of the well-known Locomotive type, with open bottom and mud ring, and are made of open-hearth homogeneous steel plate, and in the best manner throughout, with double-riveted longitudinal seams and large furnace with ample grate surface.

The bottom ring of the furnace is made of a two by three inch wrought-iron bar, giving a three-inch water space on all sides of the fire, and all parts of the boiler are strongly stayed and braced.

The Regular Fixtures comprise: Grates, Steam-Gauge; Water-Gauge; Gauge-Cocks; Safety-Valve; and Blow-off Cock.

SPECIFICATIONS OF PORTABLE BOILERS.

Number of Size	4	5	6	7	8	9	10	11	12	13	14	15
Horse Power, as usually rated	25	30	35	40	50	60	70	80	90	100	110	125
Diameter of Boiler ... in inches	40	42	44	44	48	54	56	58	58	62	64	66
Length of Furnace inside ... "	48	50	50	54	54	60	60	60	60	60	60	60
Width of Furnace inside ... "	34	36	38	38	42	48	50	52	52	56	58	60
Height of Furnace above Grates ... "	33	34	36	36	40	44	44	48	48	50	52	58
Number of Tubes (2-inch diameter)	34	40	44	44	54	60	66	76	76	90	100	108
Length of Tubes used ... in feet	8	8	9½	10	10½	11	12	12	14	14	15	15
Thickness of Shell and outside of Fire Box ... in inches	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of Furnace Plate ... "	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
Thickness of Tube Sheets ... "	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16
Diameter of Dome ... "	22	22	26	26	26	30	30	32	32	32	36	36
Height of Dome ... "	24	24	28	28	28	34	34	36	36	40	40	40
Weight of Boiler ... about	6,300	6,900	7,600	8,100	9,000	11,000	12,800	14,000	15,000	16,400	17,200	18,100
Weight of Fixtures ... "	1,150	1,250	1,500	1,500	1,600	1,850	2,000	2,150	2,400	2,600	2,800	2,900
Weight of Boiler and Fixtures ... about	7,450	8,150	9,100	9,600	10,600	12,850	14,800	16,150	17,400	19,000	20,000	21,000
Boiler, with Regular Fixtures ... $	$	$	$	$	$	$	$	$	$	$	$	$

SMOKESTACKS FOR ABOVE BOILERS FURNISHED, WHEN SO ORDERED, AT THE ADDITIONAL PRICE.

Diameter of Stack ... in inches	18	20	20	20	22	24	26	26	26	30	30	32
Length of Stack ... in feet	24	24	30	36	36	36	40	40	50	50	50	50
Price of Stack ... $	$	$	$	$	$	$	$	$	$	$	$	$

All smokestacks, up to and including 28 inches diameter, are made of No. 16 iron; and larger diameters of No. 14 iron, unless otherwise ordered. If heavier iron is required a proportionate charge will be made.

Pressure: These Boilers are designed (unless otherwise specified) to carry a working pressure of 100 pounds of steam to the square inch.

Test: They are subjected to a thorough test by us, before delivery, under a steam pressure of about 120 pounds.

Inspection and Insurance: They are carefully inspected by the Hartford Steam Boiler Inspection and Insurance Company, and tested by (warmed) water pressure to the extent of 150 pounds per square inch without developing any weakness or defects, and insured by them for one year. The certificate of inspection and test, signed by the Company's Inspector, also Policy of Insurance, will be furnished customers free of charge. This policy is payable to the purchaser, and will be in force and valid wherever the boiler is located.

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A Low Water Detector and Alarm is fitted to each boiler. This appliance is reliable, extremely simple, and cannot be tampered with when the boiler is in operation. It is a means of preventing costly damage to boiler when the water becomes dangerously low, by allowing the steam to escape and give alarm; no permanent injury is prevented and the boiler may be left in good condition. This style of DETECTOR has been approved by the United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D. C., and is required by them on all boilers under their control.

VERTICAL BOILERS.

WITH FULL LENGTH TUBES.

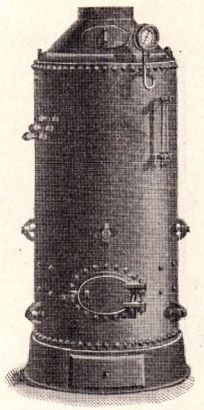
We Build the Best Boiler, of this Type, that is in the Market.

Our Vertical Boilers are made of Homogeneous Open-Hearth Steel Plate throughout, and thoroughly braced; and the longitudinal seams of the shells of Boilers 36 inches and larger in diameter are double riveted

Boilers 24, 30 and 36 inches in diameter have two and the larger sizes three hand-holes in the water leg around the fire, and the same number over crown-sheet.

The Regular Fixtures comprise: Base; Grates (having one half inch opening); Hood; Steam-Gauge; Water-Gauge; Gauge-Cocks; Safety Valve and Blow-off Cock. The extension shell is furnished with No. 19 and larger sizes, instead of the cast-iron base, and the height of boiler given below, for No. 19 and larger sizes, includes extension of shell.

When these boilers are ordered mounted on wheels, as shown on second page of cover, the tongue is furnished; but the neck-yoke, evener, whiffletrees and brake are subject to order, and are charged extra.



JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

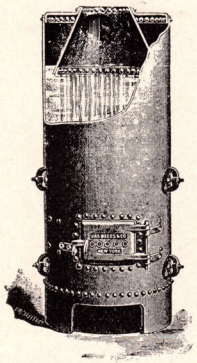
SPECIFICATIONS OF VERTICAL BOILERS.

Number of Size	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Horse-Power, as usually rated	4	5	6	8	10	12	15	18	20	25	30	35	40	45	50	60	70	80	90	100	90	100	100	110	110	110	120	120	120	120	140
Diameter of Boiler.....in inches	24	24	24	30	30	30	36	36	36	42	42	42	48	48	48	54	54	54	60	60	66	72	60	66	72	60	66	72	60	66	72
Height of Boiler.....in feet	5	5	6	5	6	7	6	7	8	6	7	8	6	7	8	6	7	8	6	7	11	11	8	11	11	8	11	11	8	11	11
Diameter of Furnace.....in inches	20	20	20	25	25	25	31	31	31	37	37	37	43	43	43	48	48	48	54	60	66	54	60	66	54	60	66	72	60	66	72
Height of Furnace..... "	24	24	24	27	27	27	27	27	27	27	27	27	30	30	30	30	30	30	30	30	30	42	30	30	42	30	30	42	30	30	42
Thickness of Shell..... "	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Heads..... "	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Furnace Plate "	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	¼	¼	No. 2	¼	¼	No. 2	¼	¼	No. 2	¼	¼
Length of Tubes used.....	24	28	28	33	42	42	51	57	57	63	69	81	72	78	90	78	90	102	102	102	114	114	90	102	102	90	102	102	90	102	102
Number of Tubes (all 2 in. diam.)	31	31	51	55	55	55	77	77	77	109	109	109	149	149	149	181	181	181	205	205	205	205	265	265	265	265	265	265	325	325	325
Square Feet Heating Surface about	46	60	75	92	112	120	159	170	177	227	257	267	334	351	368	428	456	485	513	518	525	565	1,060	1,080	1,080	1,200	1,200	1,200	1,320	1,320	1,320
Weight of Boiler with't Fixt's about	900	1,000	1,150	1,350	1,500	1,700	2,100	2,300	2,600	3,000	3,400	3,800	4,400	4,600	5,000	6,000	6,200	6,800	8,000	11,000	10,000	10,500	11,000	10,000	11,000	11,000	11,000	12,000	11,000	11,000	12,000
Weight of Boiler Fixtures..... "	400	400	400	500	550	550	650	650	650	1,000	1,000	1,000	1,700	1,700	1,700	2,000	2,000	2,000	2,000	2,500	2,000	2,000	2,000	2,000	2,000	2,500	3,000	3,000	2,400	2,500	3,000
Weight of Boiler complete ...about	1,300	1,400	1,550	1,700	2,050	2,250	2,750	3,150	3,450	4,000	4,400	4,800	6,100	6,300	6,700	8,000	8,200	8,800	10,000	13,500	12,000	12,500	13,000	12,000	13,000	13,500	14,000	15,000	13,400	13,500	15,000
Boiler, with Regular Fixtures	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
Price of Injector, fitted to Boiler	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
Price of Smokestack .....per foot	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$

Pressure: These boilers are designed (unless otherwise specified) to carry a working pressure of 100 pounds of steam to the square inch.

Test: They are subjected to a thorough test by us, before delivery, under a steam pressure of about 150 pounds.

Inspection: They are carefully inspected by the Hartford Steam Boiler Inspection and Insurance Company, and tested by (warmed) water pressure to the extent of 150 pounds per square inch without developing any weakness or defects. The certificate of inspection and test, signed by the Company's Inspector, will be furnished customers free of charge.



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VERTICAL BOILERS.

WITH SUBMERGED TUBES

Our Vertical Boilers are made of Homogeneous Open-Hearth Steel Plate throughout, and thoroughly braced; and the longitudinal seams of the Shells of Boilers 36 inches and larger in diameter are double-riveted.

Boilers 24, 30 and 36 inches in diameter have two and the larger sizes three hand-holes in the water leg around the fire, and the same number over the crown-sheet.

The Regular Fixtures comprise.: Base; Grates; Steam-Gauge; Water-Gauge; Gauge-Cocks; Safety-Valve and Blow-off Cock.

Hoods *are not* required with this style of Boiler.

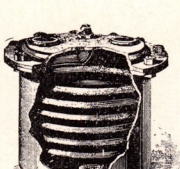
Extension Shell is not furnished with Boiler unless specified in order. If ordered, price will be same as cast-iron base.

SPECIFICATIONS OF VERTICAL BOILERS.

Number of Size	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Horse-Power, as usually rated	4	5	6	8	10	12	15	18	20	25	30	35	40	45	50	60
Diameter of Boiler ...in inches	24	24	24	30	30	36	36	36	42	42	42	48	48	48	54	54
Height of Boiler (shell not extended) ...in feet	5½	6	6½	6	6½	6½	7	8	7½	8	9	9	9¾	10	9¾	10½
Diameter of Furnace ...in inches	20	20	20	25	25	31	31	31	37	37	37	43	43	43	48	48
Height of Furnace "	24	24	24	27	27	27	27	27	27	27	27	30	30	30	30	30
Height of Chamber "	18	18	18	18	18	18	18	18	24	24	24	27	27	27	30	30
Thickness of Shell "	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Heads "	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of Furnace and Chamber Plates "	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2
Length of Tubes used "	24	30	36	27	33	33	39	51	39	45	57	51	57	63	54	66
Number of Tubes (all 2-inch diameter) "	31	31	31	55	55	77	77	77	109	109	109	149	149	149	201	201
Square Feet Heating Surface ...about	44	52	60	83	98	133	155	196	215	244	301	370	409	448	518	623
Weight of Boiler Without Fixtures ...about	1,050	1,100	1,200	1,350	1,700	2,100	2,250	2,500	2,900	3,100	3,400	4,300	4,550	4,750	5,500	6,100
Weight of Boiler Fixtures "	400	400	400	550	550	850	850	850	1,300	1,300	1,300	1,700	1,700	1,700	2,300	2,300
Weight of Boiler, complete ...about	1,450	1,500	1,600	2,100	2,250	2,950	3,100	3,350	4,100	4,300	4,600	6,000	6,250	6,450	7,800	8,400
Boiler, with Regular Fixtures	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$

A Low Water Detector and Alarm is fitted to each Boiler. This appliance is reliable, extremely simple, and cannot be tampered with when the Boiler is in operation. It is a means of preventing costly damage to Boiler when the water becomes dangerously low, by allowing the steam to escape and give alarm; so permanent injury is prevented and the Boiler may be left in good condition. This style of DETECTOR has been approved by the United States Board of Supervising Inspectors of Steam Vessels, Navy Department, Washington, D. C., and is required by them on all Boilers under their control.

FEED-WATER HEATERS, CAST-IRON, WITH WROUGHT-IRON COIL.



As shown in cut, these are constructed of a cast-iron case having connections on the cover into which the exhaust pipe from an engine or pump is to be run, for the purpose of heating the feed-water while on its way through the inclosed coil to the boiler. Water of condensation collecting in the bottom of the cast cylinder can be drawn through the tapped opening made for this purpose.

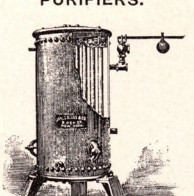
The accompanying table shows the size of connections for both the exhaust steam and the water connection to the coil, and the numbers also shown correspond with these sizes.

As large an amount of pipe as can be conveniently got into the coil is used, so that water returning to the boiler will be heated to a satisfactory temperature.

The numbers cast on the covers correspond with those in the table.

Number	1	2	3	4	5
Size of Pipe	¾	1	1¼	1½	2
Diameter of Cylinder.....inches	12½	14½	16½	20½	24
Height of Cylinder	12	14	16½	20	24
Feet of Pipe in Coil	15	17	24	35	46
Price	$20	$30	$45	$80	$130

TUBULAR FEED-WATER HEATERS AND PURIFIERS.



Our Tubular Feed-Water Heater and Purifier is simple in construction and efficient in operation. A steam chamber is provided at each end. The heads are connected by two-inch tubes, and the covers are held in place by stud bolts. Four hand-holes, conveniently placed, afford ready access for cleaning. Nos. 9 and 10 have two additional hand-holes. Water surrounds the tubes.

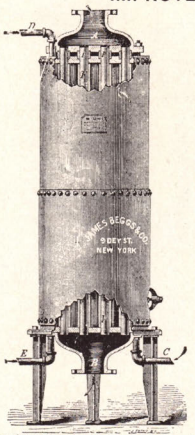
Where exhaust steam is brought into immediate contact with the feed-water, more or less oil from the cylinder of the engine is constantly passing into the boiler with the feed-water, and in time coats the inner surface of the boiler and causes the plates to warp and crack.

When so ordered, we make these Heaters with brass tubes at an additional price.

SPECIFICATIONS OF TUBULAR HEATERS.

Number of Size	1	2	3	4	5	6	7	8	9	10
Horse-Power, as usually rated	25	30	40	50	65	100	140	200	260	350
Diameter of Heater.....in inches	20	20	20	24	24	30	30	36	42	42
Length over all..... "	42	42	48	48	52	58	68	78	84	84
Number of Tubes, all 2-in. diameter	15	20	20	27	32	46	52	66	80	100
Length of Tubes used.....in inches	30	30	36	36	36	42	48	54	60	60
Thickness of Shell..... "	3/16	3/16	3/16	3/16	3/16	1/4	1/4	1/4	1/4	1/4
Thickness of Heads..... "	1/4	1/4	1/4	1/4	1/4	5/16	5/16	3/8	3/8	3/8
Diameter of Exhaust..... "	3	3½	4	4½	4½	6	7	10	10	10
Diameter of Feed-Pipe..... "	1	1¼	1¼	1¼	1¼	1½	2	2	2½	2½
Size of Safety-Valve..... "	1¼	1¼	1¼	1¼	1¼	1½	2	2	2	2½
Weight, in pounds.....about	900	1000	1100	1300	1400	1700	1900	2800	3400	3600
Regular Iron Tube Heater	$	$	$	$	$	$	$	$	$	$
Brass Tube Heater (Tubes No. 14, Stubs' Gauge)	$	$	$	$	$	$	$	$	$	$

IMPROVED TUBULAR FEED-WATER HEATER AND PURIFIER.



In this Heater the feed-water for steam boilers is heated and purified by the exhaust steam from a steam engine (or other source) without bringing the steam into contact with the water, which is the only way that feed-water (free from grease, and the impurities of the water combined with it) can be obtained, and these delcterious matters prevented from going into the boiler and fouling it, causing pitting, corroding and burning of the plates.

This is the most economical way in which pure hot water can be obtained for manufacturing purposes in mills and factories, and purified hot or cold water for breweries, hotels, hospitals, homes and institutions of all kinds needing pure water.

These Heaters and Purifiers are used in connection with all regular steam engines, also compound condensing, and triple expansion engines, where they produce the best economy of fuel.

Each tube is allowed free expansion and contraction independent of the shell, heads or other tubes. Both ends of the tubes are easily accessible, and the entire number can be removed and a new set inserted, should occasion require, without removing the Heater from its legs or breaking any pipe connections, except the connections of exhaust with nozzles. Hand-holes furnish a ready means for cleaning and washing out.

These Heaters are made for either vertical or horizontal positions, but the vertical position is the most efficient, for the reason that the steam enters at the top and passing down through the tubes is compressed so as to fill the entire space—very much better than when steam is introduced at the bottom. The water of condensation falls to the bottom, where it is easily drawn off. This produces a very much better result, and more steam is condensed than where the water of condensation is blown up through the tubes with the escaping steam. As a natural result the feed-water is taken through the pipe **D** at a temperature of 206 to 212 degrees, the top being the hottest part of the Heater. The hot water rises to the top, and the hot steam entering at that point furnishes hot water to feed the boiler almost immediately after starting the engine. The water from pump enters the heater through the pipe **C** and consequently travels as it rises in a diagonal course to opposite side, where it leaves through the pipe **D**. Thus it will be seen we get a better circulation of water among the tubes than could otherwise be secured.

This Heater will, therefore, purify the water, and will precipitate more scale-producing substances than could be attained with any other arrangement. The sediment which falls to the bottom in the form of mud is blown off through the pipe **E** with waters containing magnesia and other substances which float; a surface blow-off is attached to the shell near the top through which the scum may be blown off.

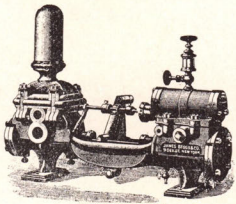
PRICE LIST AND DIMENSIONS.

Number.	Size.	Horse Power, at 4 gals. per hour.	Capacity, gals.	Number of Brass Tubes.	Size of Tubes.	Length of Tubes.	Area of Tubes.	Size of Ex. Pipe.	Area of Ex. Pipe.	Diam. of Flanges.	Heating Surface.	Tons Required.	Shipping Weight. Each Heater Packed in Case.	Price.
A 1	18x 5	36	66	10	2	5	24	4½	15	9	25	27	850	$ .....
B 1	18x 6	43	79	10	2	6	24	4½	15	9	30	27	980	.....
C 1	18x 7	50	92	10	2	7	24	4½	15	9	35	27	1,065	.....
A 2	21x 6	60	94	14	2	6	35	5	19	10	42	23	1,350	.....
B 2	21x 7	70	109	14	2	7	35	5	19	10	49	23	1,800	.....
C 2	21x 8	80	124	14	2	8	35	5	19	10	56	23	1,450	.....
A 3	24x 6	77	123	18	2	6	43	6	28	11	54	24	1,550	.....
B 3	24x 7	90	141	18	2	7	43	6	28	11	63	24	1,650	.....
C 3	24x 8	103	159	18	2	8	43	6	28	11	72	24	1,800	.....
A 4	27x 6	103	154	24	2	6	57	7	38	12	72	22	2 000	.....
B 4	27x 7	120	179	24	2	7	57	7	38	12	84	22	2,050	.....
C 4	27x 8	137	204	24	2	8	57	7	38	12	96	22	2,250	.....
D 4	27x 9	154	229	24	2	9	57	7	38	12	103	22	2,300	.....
A 5	30x 7	150	222	30	2	7	72	8	50	13	105	22	2,550	.....
B 5	30x 8	171	254	30	2	8	72	8	50	13	120	22	2,600	.....
C 5	30x 9	190	286	30	2	9	72	8	50	13	135	22	2,950	.....
D 5	30x10	214	318	30	2	10	72	8	50	13	150	23	3,150	.....
A 6	36x 8	217	379	38	2	8	91	10	78	15	152	26	3,600	.....
B 6	36x 9	244	426	38	2	9	91	10	78	15	171	26	3,960	.....
C 6	36x10	270	473	38	2	10	91	10	78	15	190	26	4,400	.....
D 6	36x11	298	520	38	2	11	91	10	78	15	209	26	4,500	.....
A 7	42x 9	295	580	46	2	9	110	10	78	15½	207	29	.....	.....
B 7	42x10	328	644	46	2	10	110	10	78	15½	230	29	5,400	.....
C 7	42x11	360	708	46	2	11	110	10	78	15½	253	29	.....	.....
D 7	42x12	394	772	46	2	12	110	10	78	15½	270	29	6,450	.....
A 8	48x 9	386	757	60	2	9	114	12	113	18	270	29	.....	.....
B 8	48x10	420	841	60	2	10	114	12	113	18	300	29	7,100	.....
C 8	48x11	472	925	60	2	11	114	12	113	18	330	29	.....	.....
D 8	48x12	514	1009	60	2	12	114	12	113	18	360	29	.....	.....
F 8	48x14	600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,000	.....

All Feed-Water Heaters and Purifiers have two-inch Seamless Brass Tubes, two pounds per foot.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

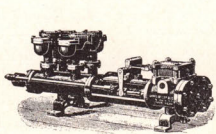
SINGLE CYLINDER STEAM PUMP.



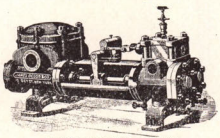
PUMP No. 3. 5½x6x8.

Number.	Diameter of Steam Cylinder, in Inches.	Diameter of Water Plunger, in Inches.	Length of Stroke, in Inches.	Strokes per minute for ordinary service and continuous work.	Capacity, in gal. per min.	Size of Steam Pipe.	Size of Exhaust Pipe.	Size of Suction Pipe.	Size of Discharge Pipe.	Prices.
0	3	1½	4	100 Str.	4	¼	¾	1	¾	$50
1	3½	2	4	100 "	5	¼	¾	1	¾	65
1½	3½	2½	5	90 "	8	½	¾	1¼	1	95
2	4	2½	5	90 "	10	½	¾	1½	1	105
3	5½	3½	6	85 "	21	¾	1	2	1½	145
4	5½	3½	8	80 "	30	¾	1	2½	2	175
4½	6	4	8	80 "	34	¾	1	2½	2	200
5	7	4½	10	75 "	51	1	1½	3	2½	275
7	10	6	12	60 "	87	1¼	2	4	3	400
9	4	8	12	60 "	150	2	2½	5	3½	500

DUPLEX BOILER FEED STEAM PUMP.



PRESSURE PATTERN. Size, 6x3½x6.



REGULAR PATTERN. Size, 6x4x6.

The following sizes are selected as being those best proportioned for this particular service.

REGULAR PATTERN.

Diameter of Steam Cylinders.	Diameter of Water Plungers.	Length of Stroke.	Horse Power of Engine required to be guide to drive pump with supply with ease.	Diameter of Fixing, single cylinder pump, or duplex pump with 9/4 steam work.	Sizes of Pipes for Short Lengths. To be increased as length increases. Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Discharge Pipe.	Prices.
2	1½	5	35	1¼	¾	1	1	¾	$
3	1⅝	5	60	1¼	¾	1	1¼	1	
4	2	5	120	1¼	¾	2	1½	1¼	
5	2½	8	300	1¼	1	2	2½	1½	
6	3	6	400	1¼	1	2	3	2	
7	4½	6	500	1¼	1½	2	4	3	
8	4½	10	700	1¼	1½	2	4	3	
9	5	10	900	1¼	2	2½	4	3	
10	6	10	1,200	1¼	2	2½	5	4	

PRESSURE PATTERN.

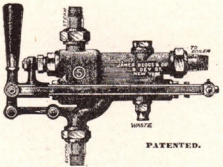
4	2	4	195	3½	¾	¾	1¼	1¼	$
5	3	5	295	4½	1	1	2	1½	
6	3½	6	300	5	1	1½	2½	2	
7	4	6	400	5½	1¼	1½	3	2½	
7½	4½	10	600	6	1½	2	4	3	
10	5	10	1,000	7½	2	2½	4	3	

A slight additional charge is made when pumps are fitted with Brass Plungers and Piston Rods.

To designate the sizes, give the diameters of Steam Cylinders and Water Plungers, and length of stroke.

☞ In addition to the sizes given in the above list, a large number of other sizes and combinations can be supplied to meet the requirements of any particular service.

As Boiler feeding is usually heavy, continuous work, we recommend a size large enough to keep up the supply of water in the Boiler when the Pump is run slowly. This avoids the concussion and jar of the pipes and connections which is always noticeable when Pumps are run fast on this work. For feeding hot water, set the Pump below the supply, so the water will flow into it, as hot water cannot be lifted by suction. Allow 7½ gallons per hour for each horse-power.



PATENTED.

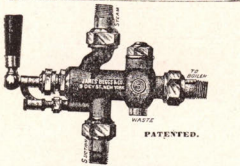
Double Tube. Operated entirely by one Lever

HIGH DUTY INJECTOR.

A higher degree of efficiency secured than ever before. Will lift either hot or cold water, and is guaranteed to work satisfactorily under all pressures from 20 to 200 pounds, and to lift from 10 to 24 feet, or take supply direct from tanks or water-works pressure.

PRICE LIST.

Size.	Size Connections. Suction and Delivery.	Size Connections. Steam.	Gallons per Hour.	Horse Power.	Price.
3/16	1/4	1/4	85	4 to 8	$ 22 00
1/4	3/8	3/8	120	8 to 12	25 00
5/16	3/8	3/8	180	12 to 25	28 00
3/8	3/8	3/8	260	20 to 35	35 00
7/16	3/8	3/8	350	30 to 45	40 00
1/2	1/2	1/2	450	40 to 60	50 00
11	1	1	615	60 to 80	60 00
13	1 1/4	1	725	75 to 100	65 00
13/4	1 1/4	1 1/4	900	90 to 125	80 00
15	1 1/2	1 1/2	1,283	120 to 175	85 00
15/8	1 1/2	1 1/2	1,700	160 to 225	100 00
17	2	1 1/2	2,200	200 to 300	120 00
17/8	2	1 1/2	2,950	250 to 375	135 00



PATENTED.

Operated entirely by One Handle.
No Valves required in either Steam or Suction Pipe.
Perfectly Automatic and Re-Starting.

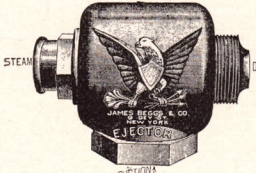
AUTOMATIC INJECTOR.

Particularly Adapted for Use on Traction, Portable and Marine Boilers.

The capacity of this machine can be graded over fifty per cent., thus supplying the boiler with the exact quantity of water required to run the Injector continuously. It works equally well whether lifting water or taking supply from overhead tanks or city pressure, and does not require valves to regulate the machine, in either the steam or supply pipe, when in use under either condition—points that are not attained in any other machine made.

PRICE LIST OF AUTOMATIC INJECTOR.

Size.	Size Connections. Suction and Delivery.	Size Connections. Steam.	Gallons per Hour.	Horse Power.	Price.
2	3/4	3/4	40	2 to 4	$ 16 00
3	3/4	3/4	90	4 to 8	18 00
5	3/4	3/4	120	8 to 12	20 00
7	3/4	3/4	180	12 to 20	25 00
9	3/4	3/4	230	20 to 30	30 00
9/16	1	1	450	30 to 45	40 00
11	1	1	550	45 to 60	45 00
13	1 1/4	1	720	60 to 85	55 00
15	1 1/4	1 1/4	900	85 to 120	60 00
19	1 1/2	1 1/2	1,200	120 to 165	75 00
21	1 1/2	1 1/2	1,740	165 to 230	90 00
23	2	1 1/2	2 200	200 to 300	110 00
	2	1 1/2	2 800	275 to 375	125 00



No Valves to Wear. No Liability of Getting Out of Order.
A Complete Steam Pump at a Small Cost.

EJECTOR OR JETOMETER.

For Pumping Water or Other Liquids. Is Operated with Less Steam Than Any Other Ejector Made.

It is adapted for raising water from deep wells; for pumping out the holds of vessels; for use in tanneries in conveying liquids; for pumping out mines, cellars or cesspools; for filling tanks at railroad stations or elsewhere; for feeding into the tender of locomotives. Can be arranged to lift water to any height desired. It is the best bilge pump made. It is made so that parts liable to wear can be replaced, when required, at small expense.

PRICE LIST.

No.	Size of Suction and Discharge Pipe.	Size of Steam Pipe.	Capacity per Hour.	Price.
2	1/4 inch.	1/4 inch.	250 gals	$ 8 00
4	3/8 "	3/8 "	500 "	10 00
6	1/2 "	1/2 "	1,000 "	13 00
10	1 1/4 "	3/4 "	1,600 "	20 00
12	1 "	1 "	3,000 "	25 00
14	2 "	1 "	4,000 "	35 00
16	2 1/4 "	1 1/4 "	6,000 "	45 00
17	3 "	1 1/4 "	10,000 "	60 00
18	4 "	2 "	15,000 "	80 00

Ejectors of larger capacity or for special purposes made to order.

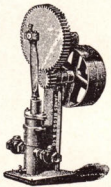
WATER PRESSURE EJECTORS.

We also make Ejectors that can be worked by water pressure. These Ejectors will eject double the quantity of water that it takes to run them, and they can be used to advantage in excavations, cellars, etc., where water pressure can be had and the ele vation required is not too high for the pressure obtained

DIMENSIONS AND PRICES.

No.	20	22	24
Capacity, gallons per hour	375	600	1,275
Size of Water Pressure Pipe	1/4 inch.	3/4 inch.	1 inch.
Size of Delivery Pipe	1 "	1 1/4 "	1 "
Price	$18 00	$28 00	$38 00

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

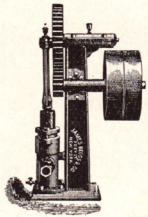


SINGLE 2-INCH BOILER FEED PUMP.

Geared 4½ to 1; 12-inch pulleys; 2-inch face. All our pumps are connected with ball and socket in plungers.

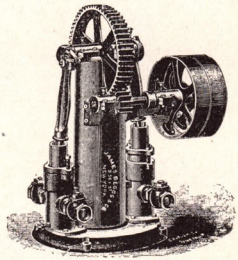
Number.	Diameter and Length of Stroke.	Number of Strokes Per Minute.	Capacity Per Hour.	Prices.
2, Single.....	2x4	40	130	$42 00
3, "	3x6	40	420	56 00
3, Double.....	3x6	40	840	185 00
4, "	4x6	40	1,860	.....
3, Gang.....	3x6	40	1,680	.....
4, "	4x6	40	3,600	.....

These speeds can be changed from 20 to 50 revolutions per minute to get required quantity of water.



SINGLE 3-INCH BOILER FEED PUMP.

This is the strongest pump in the market, built for heavy work and positive action. Geared 3 to 1; 1¼-inch steel crank-pin; about 3 feet 4 inches high, base 11x15 inches; pulleys 14 inches in diameter, 3¼-inch face; bearing on large gear shaft 10 inches long, 1¾ inches in diameter; bearing on pinion shaft 8¼ inches long, 1¼ inches in diameter; ball and socket joint; adjustable at upper end of plunger. The steel ball at bottom end of connecting rod is submerged in oil contained in the hollow plunger.



DOUBLE 3 AND 4 INCH GEARED PUMP.

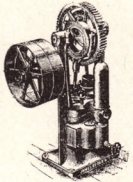
FOR HOT OR COLD WATER.

It is 3 feet 6 inches high, fitted for 2-inch suction and discharge. Geared 4½ to 1. Steel crank-pins, 1¼ inches in diameter, Stroke, 6 inches. Diameter of base, 23 inches. Diameter of pulleys, 18 inches; 3¼-inch face. Can be used with one pump for hot water, the other for cold, or one pumping to tank and the other to boiler, or both together. The boxes are furnished with oil cups to keep dust out of the journals. Connected to plungers by novel and durable steel ball and socket joint, which is held in position by a sleeve having three inches of thread cut in upper part of plunger. By turning this sleeve it will take up all lost motion, avoiding the pounding usually heard in most any other make of pump.

The ordinary sizes of check valves used are: 2-inch on double 4-inch, 1¼-inch on double 3-inch and single 3-inch, 1¼ and 1 inch on single 3-inch.

Double Plunger Belt Pump.

The most economical means for supplying Water to Boilers, Tanks, etc.



It has a Passover Valve to regulate the supply of water without changing the speed of the pump. Suitable for either hot or cold water, and is furnished complete with gears, fast and loose pulleys, and valves ready to connect.

Price List of Double Pumps, Geared 4½ to 1.

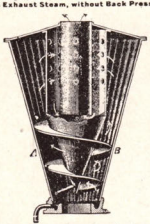
No.	Plunger.	Stroke.	Suction and Discharge.	Size of Pulleys.	Gals. per Double Stroke.	Strokes per Minute.
2	3	4	1¼	14x3	0.344	10 to 40
3	4	6	2	20x4	0.862	10 to 30
4	6	9	2½	26x5	1.478	10 to 30

No.	Medium speed.	Gals. per Hour at Moderate Speed.	Price.	Price with Cut Gears.
2	30	440	$137 00	$156 00
3	20	750	162 00	212 00
4	29	1,760	300 00	330 00

Patent Centrifugal Exhaust Head.

For Exhaust Steam Pipes.

Thoroughly entraps Water and Grease from the Exhaust Steam, without Back Pressure.



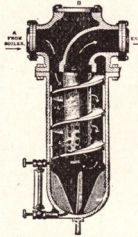
Saves Roofs by keeping them dry, utilizes the water of Exhaust Steam and avoids spraying the pavement. Should be used by all Rolling Mills, Blast Furnaces, Breweries and Manufactories using steam.

List of Prices and Sizes of Exhaust Pipe Heads.

Size for		Price.
1	inch Iron Pipe	$16 00
1¼	" "	22 00
2	" "	28 00
2½	" "	36 00
3	" "	40 00
3½	" "	45 00
4	" "	50 00
4½	" "	60 00
5	" "	70 00
6	" "	85 00
7	" "	110 00
8	" "	130 00
9	" "	150 00
10	" "	180 00
12	" "	220 00
14	" "	260 00
16	" "	300 00

Centrifugal Separator and Trap.

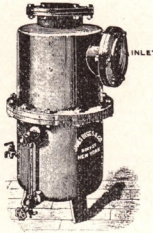
For Supplying Clean and Dry Steam to Engines, Dry Houses, etc.



Place Separator as close to engine as possible. The steam taking a spiral course between the brass causes the water to be thrown by centrifugal force against the outer walls, while the dry steam goes through the small holes to center of pipe. Steam can enter at A or B as convenience may require, also used in conveying steam long distance for Steam Hammers, and Dry Houses.

Size of Steam Pipe.		Price.
1	inch, Screwed,	$25 00
1¼	" "	27 50
2	" Flanged,	50 00
2½	" "	62 50
3	" "	75 00
3½	" "	87 50
4	" "	100 00
4½	" "	112 50
5	" "	125 00
6	" "	150 00
7	" "	175 00
8	" "	200 00
9	" "	250 00
10	" "	300 00

Centrifugal Oil Extractor.



PRICE LIST.

Size of Exhaust Pipe.		Price.
1	inch, Screwed,	$25 00
1½	" "	30 00
2	" Flanged,	50 00
2½	" "	62 50
3	" "	75 00
3½	" "	87 50
4	" "	100 00
4½	" "	112 50
5	" "	125 00
6	" "	150 00
7	" "	175 00
8	" "	200 00
9	" "	250 00
10	" "	300 00

Screwing Flanges Included.

STEAM FLUE BLOWER.

Always Reliable, Simple in Construction, Easy to Operate, Economizes Fuel. Increases Boiler Capacity.

CUT SHOWING BLOWER FOR HORIZONTAL BOILERS

PRICE LIST.

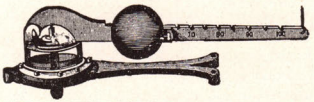
No. of Blower.	Size of Tubes, Outside Diameter.	Price with Clamps and Nipple.
No. 0	1¼ to 1½	$5 00
No. 1	2 to 2½	6 00
No. 2	2½ to 2¾	6 25
No. 3	3 to 3½	7 50
No. 4	3½ to 3¾	8 75
No. 5	4 to 4½	10 00
No. 6	5 to 6	12 50

☞ The above prices do not include Hose and Globe Valves, which we can furnish of very best quality and at lowest market price.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

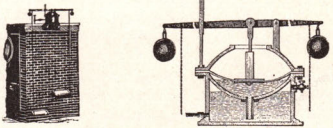
STEAM DAMPERS OR DRAFT REGULATORS.

FOR HIGH PRESSURE.

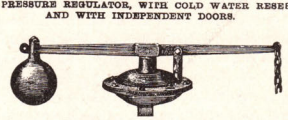


Numbers	1	2	3
For Boilers, Horse Power and under	5	20	30
Price	$10	$15	$25

DAMPER REGULATORS FOR LOW PRESSURE.



LOW PRESSURE REGULATOR, WITH COLD WATER RESERVOIR, AND WITH INDEPENDENT DOORS.

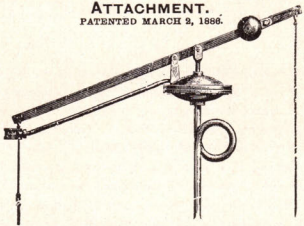


CHEAP PATTERN LOW PRESSURE DAMPER REGULATOR.

With Cold Water Reservoir and with Independent Doors	$15 00
" " " without Doors	12 00
Cheap Pattern, 7-inch Plates	5 00
" 9- " "	7 50

DAMPER REGULATOR, WITH SAFETY ATTACHMENT.

PATENTED MARCH 9, 1886.



Nearly all low pressure heating apparatus are controlled automatically by means of a regulator consisting of a flexible diaphragm made of rubber, which is a perishable material, likely to crack after being used a comparatively short time, and finally to rupture when some trifling excess of pressure beyond what has commonly been used is applied to it.

When this does occur it is self-evident that the diaphragm, together with the post and lever above it, will at once drop to the same position as that in which they stand when there is no pressure on the boiler, the effect of which is to close the air door above the fire and to open the ash-pit door to its fullest extent.

The boiler at once "runs away" and if there is no one fortunately at hand to reverse the position of the doors and check the fire the consequences are likely to be serious, the least evil being that of blowing out the water through the safety valve and burning the boiler.

Such an accident is most likely to take place at the very time that the results are likely to be the most harmful; that is, when there is a large fire, with the furnace full of burning coal.

Occurring, as is very possible, during a cold night, when all the household are asleep, the consequences can be imagined.

To avoid such accidents, this Regulator with Safety Attachment, patented March 2, 1886, has been designed and is offered to the trade with the confident assurance that when appreciated, no prudent or careful steam-fitter will construct a low pressure boiler without using this Regulator, as with it such an accident as described above is impossible.

The attachment is constructed as follows:

Into the chamber of the Regulator, but above the diaphragm, is tapped a piece of ½-inch pipe, which extends laterally out as far as the lever to which the chain of the ash-pit door is usually attached.

The pipe terminates in a fitting of peculiar shape containing a slot through which slides a link of fusible metal—the latter being attached to and forming a part of the door chain.

In the event of the bursting of the diaphragm it is relieved of pressure and the lower door opens, but as the hot water and steam pass through the rupture they are at once conducted through the ½-inch pipe to the link, which, instantly melting, parts the chain, drops the door and checks the fire.

The cost is so little beyond that of ordinary regulators, when compared with the whole cost of an apparatus, as to form no excuse for not applying this Regulator.

All links are carefully made of an express alloy, which we guarantee to melt at 160° F.

With each regulator an extra link is furnished.

The attachment can be applied to all diaphragm regulators in use, on the latter being sent to us.

PRICES, WITH SAFETY ATTACHMENT.

Regulator, with 7-inch plates, including Gooseneck	$ 8 00
" " 9 " "	12 00

CHEAP FUEL.

IN this age of natural gas and close competition, the subject of cheap fuel for boiler furnaces has become a question of vital importance to manufacturers who use steam for power and who are located in parts of the country distant from the coal fields or the gas-producing districts. We are constantly receiving letters of inquiry from all parts of the country with reference to this subject. We therefore take this opportunity to give the results of our experience developed from an almost daily contact with this question during the past nine years or more. In the first place, we would call attention to the fact that certain kinds of fuel may be cheap in one part of the country and the reverse in another part. For instance, in the anthracite coal fields the waste product of the mines, commonly called culm, has proved to be a most excellent fuel for steam purposes and is now being successfully used by the largest manufacturers and producers in the coal regions, such as steel mills, collieries, silk mills, gas and electric light plants, etc. The cost of this fuel at the mines is merely nominal, but in order to burn it successfully it should contain at least fifty per cent. of buckwheat and should be fresh from the mine, for when the buckwheat is nearly all screened out of it, or when it has been exposed to the weather for any considerable length of time, it is comparatively worthless as fuel. Again, it will not pay to ship it any great distance, as the freight on culm is just as much per ton as it is on buckwheat coal, which for steam purposes is a much better fuel than culm, and costs at the mine only from thirty to thirty-five cents per ton more than culm. We, therefore, never advise the use of culm outside of the anthracite coal fields.

Anthracite screenings, the waste product of coal yards and points of reshipment, also make an economical fuel where they can be bought cheap and are not screened too closely. But owing to the fact that screenings usually have to remain out in the weather for some time before they are sold, it will be found advantageous to mix them with about one-fifth of their bulk of bituminous slack, where it can be obtained at reasonable rates.

Bituminous slack, alone, also makes an excellent cheap fuel in the soft coal districts. But among all the various kinds of cheap fuel, our experience has led us to give the preference to anthracite buckwheat coal. As a rule it contains less slate, burns steadier with blast, needs less attention, produces a larger volume of flame, and makes as hot a fire as should be put under a boiler, and when used in connection with proper appliances, will generate nearly, if not quite, as much steam per pound of fuel as that generally produced by using the highest priced coals in the market. In fact, the owners of some of the plants that we have fitted up with our appliances claim that they now make more steam per pound of fuel with buckwheat than they did when they were burning egg coal by the old method. Anthracite birdseye, which is a size still smaller than buckwheat, is now being quite extensively used for steam purposes, and is a very good fuel. When properly burned it produces a strong, steady heat, almost equal to buckwheat.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

THE McCLAVE PATENT

SHAKING, DUMPING AND CUT-OFF GRATE.

Adapted to Burn all kinds and sizes of Hard or Soft Coal, especially Anthracite Culm, Birdseye, Buckwheat, Pea Coal and Bituminous Slack.

THIS GRATE has been in successful use for about nine years, and has been adopted throughout by many of the largest concerns in the country, such as Steel Mills, Wire Mills, Paper Mills, Steam Heat Companies, Factories, Soda Ash Works, Collieries, Breweries, Electric Light Stations, Electric Railway Stations, etc. Over 4000 square feet furnished for the pipe line of the National Transit Company alone. The New York Steam Company have over 3000 square feet of these grates in their system. A long list of references will be furnished on application.

POINTS OF EXCELLENCE.

It has a fire surface especially adapted to prevent fine unconsumed fuel from running through into the ash pit. (See page 39.)

It has a thorough shaking movement, in which there is no increase in size of openings. This movement is well adapted to break up a soft coal fire when it cakes, or to remove the fine ashes from a hard coal fire when there is little, if any, clinker formed. (See page 40.)

It also has an absolute cut-off movement that will break up and remove clinkers instantly without wasting the fire. (See page 41.)

It will clean a fire uniformly from front to rear, the grate-bars at the bridge wall being crescent-shaped, so that they may operate closely to the wall. (See pages 40 and 41.)

It is constructed on principles that insure durability, there being no long lines of metal in contact with the fire.

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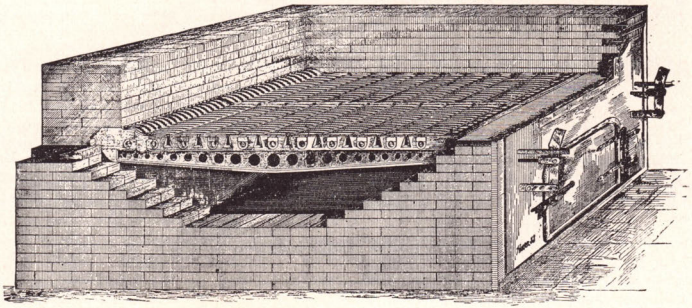
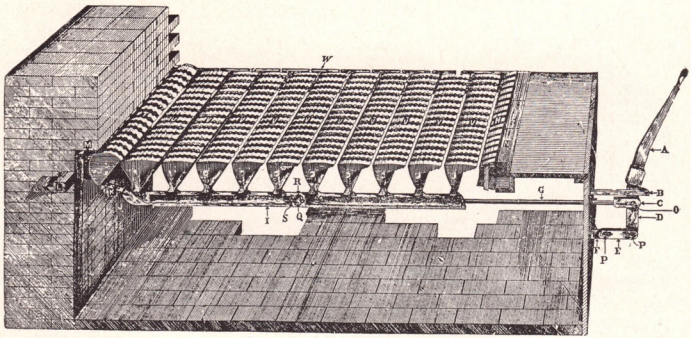


McClave Grate complete in two sections, showing the grate bars, levers, etc., in their normal position, with an open journal bar in front part of view, showing journal caps over each journal, and on each side of key to complete the journal boxes at back end of open journal bar.



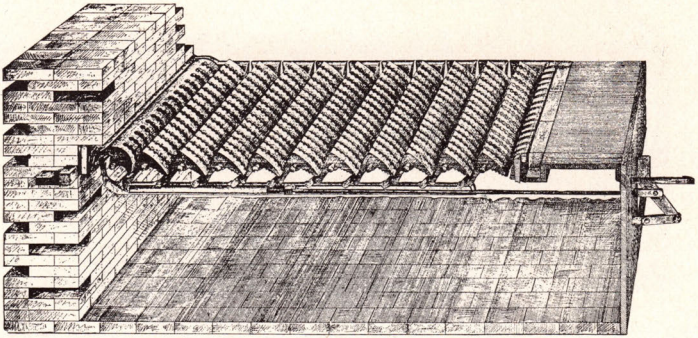
Showing one section of a McClave Grate with one journal bar removed. All the pieces in this section are designated by letters, and are named and described as follows:

A, Socket Handle.
B, Stop.
C, Jaw of connecting rod.
D, Stub lever.
E, Fulcrum straps.
F, Fulcrum stud.
G, Connecting rod.
H, Front Frame end.
I, Working bar.
J, ¼ inch bolt or pin for W. B. extension.
K, Working bar extension.
L, Back bearing bar.
M, Back frame end.
N, Fire brick filling at front end of grate.
O, 2½ inches by ½ inch bolt.
P, 2 inches by ½ inch bolts.
Q, Eye bolt for connecting rod.
R, Eye bolt washer.
S, Cotter or split pin
T, Crescent Bar.
U, Heel bar.
V, Regular grate bars.
W, Top edge of journal bar.

For further explanation of grate bars and journal bars see description on page 43. Large grates are made up by putting such sections together, and as we have patterns to make sections of different widths, also journal bars of different lengths, we can make a grate of almost any required size. The above schedule of pieces will enable any person to send for repairs without liability of mistakes. In ordering grate bars for repairs always give the length of the bar on top and on line with, but not including the journals, and state whether the working bar journal is on the right or left end of the bar (looking at the bar from the front of the furnace); as this determines whether they are right or left hand bars. Also state whether you want crescent bars, heel bars, or regular grate bars.

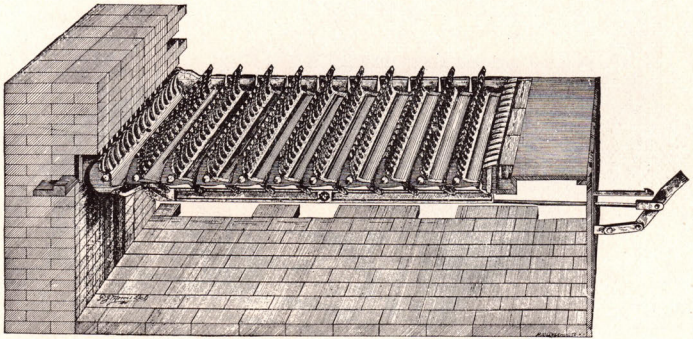
The Axel grate bar goes next to crescent bar and differs from the regular bar in having a greater concavity in the back. The object of this is to receive the nose of the crescent bar during the shaking movement. The journals on this bar are somewhat larger than those on the regular bar.

[NOTE.—For names of other parts see page 43.]

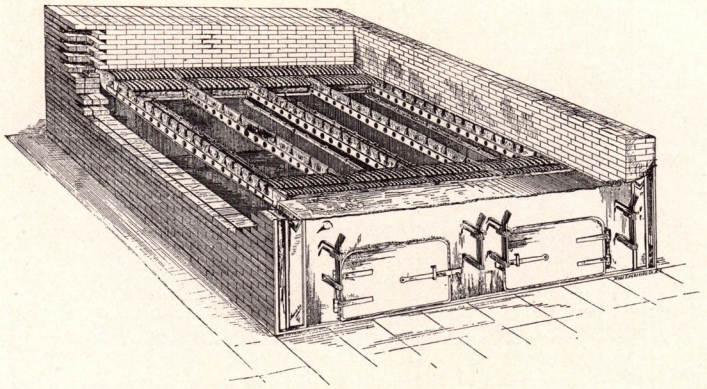


One section of McClave Grate showing shaking movement. This movement is used principally for soft coal and anthracite egg coal. In this movement there is no increase of opening during the operation, the bars keeping equi-distant from each other in their travel from the normal position downward and return. To operate, place the socket handle on the stub-lever and thrust it inward until the shoulder of connecting rod jaw strikes the front, then return to the stop; repeat it as often as necessary, always having the stub-lever resting against the stop at the finish, as this indicates when the grate-bars are level. The tendency of soft coal is to cake, and it therefore needs to be broken up very often To do this without opening the fire doors (thereby letting large volumes of air rush in over the top of the fire) has been a long-felt want, which is in a great measure supplied by this movement. An anthracite egg coal fire also needs to be shaken when there is an accumulation of fine ash, all through the mass. When there are clinkers to be removed use the cut-off movement as shown on page 41.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.



Showing cut-off movement. This movement is used principally for fine anthracite fuel, such as culm, birdseye, buckwheat and pea coal. It has become a well-known fact among the best firemen that small anthracite fuels should not be shaken or stirred up in any manner until it becomes necessary to give the fire a thorough cleaning, then it should be cleaned as quickly as possible, in order to prevent the steam from running down. This movement mows the clinkers and ashes from the bottom of the fire quickly and thoroughly, without opening a fire door and without waste of fuel; especially is this true when the Argand Steam Blowers are used for blast, as the steam serves to keep the clinkers soft, and therefore easily crushed through into the ash pit. When a fan blast or a strong chimney draught is used the clinkers are generally larger and harder and therefore more difficult to cut down. Some varieties of fine coal form large clinkers on the grate, in which case the lever should not be pulled out to the full extent of the cut-off movement but should be vibrated quickly back and forth about half way in on the shaking movement and half way out on the cut-off movement: this action will cut away the clinkers a little at a time and lessen the liability of breaking up the surface of the fire during the process of cleaning.



McClave Grate of four sections, showing one method of arranging journal bars, connecting-rods, levers, etc. In this case there is an open journal bar on each side and one in the center. The order may be reversed, viz.: Closed bars at the side and center, and open bars between, in which case the levers should be arranged horizontally; but it should be borne in mind that whichever way the grates are made at first, that is the way they must be put in the furnace, as they cannot be changed around at will afterward. The levers shown on this page are vertical, but they can be placed horizontally between the ash pit and fire doors, if so desired.

A pair of stub-levers can be placed vertically between the ash-pit doors in a space 4½ inches wide, as one stop (made out of iron 1 inch by 1¼ inches, with a catch on both edges) will serve for both stub-levers and will occupy less space than two stops.

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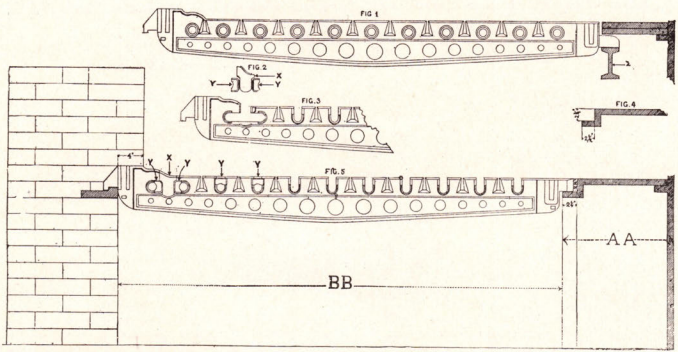


Figure 1 shows a closed journal bar with the nib at front end cut down so that it will go under the dead plate; also a different kind of front bearer than that formed by a rabbet in dead plate. This manner of arranging the front end of journal bar is special, and rarely used. Figure 2, on this plate, shows the two journal caps and keys which complete the journal boxes in back end of open journal bar, Figure 2. Figure 4 shows rabbet of dead plates and gives dimensions to make the same in order to suit the McClave Grate, viz.: 2¼ inches deep by 2½ inches projection. Figure 5 shows an open journal bar with the caps and keys in place at the back end. After the grate-bars are in place, journal caps are placed over every journal, to prevent the fire from pocketing below the surface of the grate. Figure 5 also shows our regular manner of arranging the front end of all journal bars open and closed, unless specially ordered otherwise; also position of back bearing bar, and the distance that the bridge wall projects forward on the back end of grate frame. We have patterns to make different lengths (taking measurement between the points above shown), as follows:

3 feet 0½ inch | 3 feet 6½ inches | 4 feet 0½ inch | 4 feet 6½ inches | 5 feet 0½ inch | 5 feet 6½ inches | 6 feet 1 inch | 6 feet 7 inches
7 feet 1 inch | 7 feet 7¼ inches | 8 feet 1½ inches | 8 feet 7½ inches | 9 feet 1½ inches | 10 feet 1½ inches

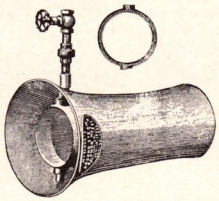
The above lengths include the allowance for expansion. We can make this grate almost any desired width. Grates up to four feet wide should have a quarter-inch expansion room on each side of the grate; above 4 feet there should be from three-eighths to one-half inch on each side the grate, according to its size. In ordering journal bars for repairs give the length as above, also state whether they are open or closed bars—the closed bar has round holes for the journals, see Figure 1, while the open bar is cut down from the top edge to the journal bearings, as shown in Figure 5.

X, Key plug. Y, Journal caps. Z, Special front bearer with holes through panel for connecting rods to pass through.

AA, Distance from outside of front to inner edge of rabbet in dead plate.

BB, Length of journal bar between shoulders, including room for expansion.

THE McCLAVE PATENT IMPROVED ARGAND STEAM BLOWER.



This blower is not the crystalized inspiration of a moment, but is the result of over ten years' close contact and experience with the problem of more effectually burning cheap, solid, carbonaceous fuels in boiler and other furnaces; and, in its present improved condition, is beyond cavil the best blower yet offered to the public.

The object of the improvements is to induct the largest possible quantity of air with a given quantity of steam, and thereby secure better combustion than heretofore.

For improvements and more particulars see following pages.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

IMPROVED ARGAND STEAM BLOWER.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

THE improvements consist: First—In changing the cross-sectional shape of the Argand ring from a practically round section to that of a lenticular form, with its thin edge presented to the inflowing air, thereby reducing the obstruction to the air to its minimum, and also preventing an eddy or suction on the jetting side of the ring.

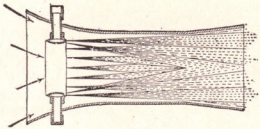
Second—The manner in which the jet holes are drilled in the ring, so as to cause one circular series of jets to blow substantially parallel with the inner side walls of the blower shell, and in close proximity thereto, and another circular series of jets, each jet of the series issuing alternately between the jets of the parallel series, in lines convergent with the axis of the shell, at a point near its outlet end. Again, we now make the jetting rings entirely of brass (finished) instead of cast-iron, which will prevent the rapid enlargement of the jet holes by oxidation common to iron.

These several improvements, especially the change in the cross-sectional shape of the ring and the peculiar arrangement of the jets, have, with the use of the same amount of steam, increased the inducting power of the blower at least 30 per cent. over our former construction (by anemometer test), and therefore will, with the use of less steam than that used in our former blower, produce a blast of equal power and of much better quality for the purpose designed, a fact that is being endorsed by every mechanical engineer who has seen it in operation; for it should be borne in mind that it is not so much the quantity as the quality of blast that is required to burn small fuel with economy, for while it is a demonstrated fact that a small quantity of steam in the blast is a potent factor in burning cheap fuels, in furnishing oxygen by the decomposition of the steam in its passage through the incandescent carbon; it is also a demonstrated fact that an excess of steam defeats proper combustion; and although a blower may have such a large steam discharge that the force of the steam can lift the fuel and make it dance above the grate, yet this is no evidence that it is a good blower for the purpose of facilitating combustion; but a blower so constructed that it will induct the largest possible quantity of air with the steam used, and at the same time thoroughly intermix the steam and air before the combined blast leaves the shell of the blower and discharged into the inclosed ash-pit, will be found to furnish a superior blast for the purpose under consideration.

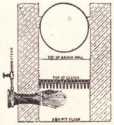
It has always been our aim, therefore, to obtain the greatest efficiency in this respect, and, while our former construction stands to-day without an equal in this particular, so far as we know, yet our present construction is far in advance of it. We, therefore, offer it to the users of steam as the most efficient steam blower yet invented, and one that makes a comparatively small amount of noise when in operation, a feature highly appreciated by firemen and engineers.

This blower will burn fine fuel on any grate of suitable mesh, but when used in connection with our Grates, a complete system is obtained for burning such fuel as anthracite culm, birdseye, Nos. 1 and 2 buckwheat, bituminous slack, sawdust, etc., as the grate is especially adapted to burning this class of fuel, and has been adopted throughout by many of the largest concerns in the country with excellent results.

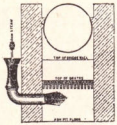
Illustrations Showing Application of Blowers to Boiler Furnaces.



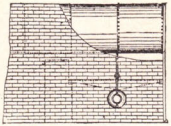
Longitudinal Section.



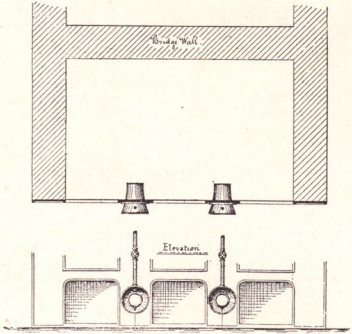
Method of placing a straight blower through side wall.



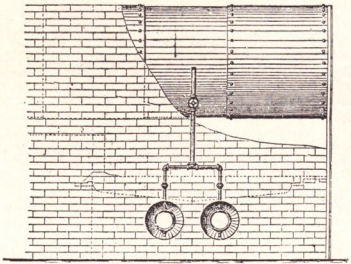
Method of placing a blower in side wall with elbow.



Side view of plate 2.

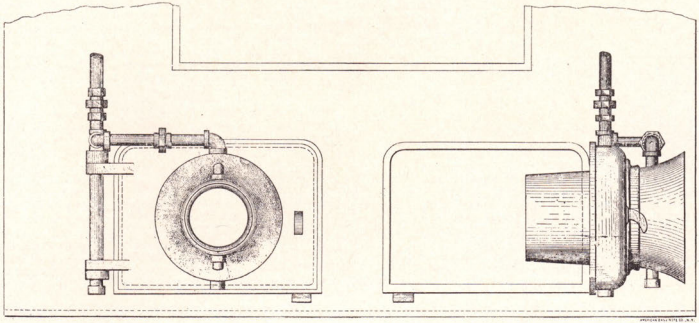


Plan and elevation for placing blower between ash doors through the front when there is sufficient space between the doors, as is sometimes the case in nests of cylinder boilers; the blowers for this purpose are 17 inches long and have a flange on them to bolt to the front.



Method of connecting two blowers in side wall or front so that both will be controlled by one globe valve. This arrangement secures greater uniformity in the blast from both, and prevents the ashes from blowing out into the boiler room.

JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.



Method of placing Blower with flange through ash-pit door, the pipe supplying steam to Blower being fitted with packed swing joint, thus enabling ash-pit door to be opened or closed as desired, as may be seen by the above cut.

BLOWER DIRECTIONS.

In ordering these blowers, state the size and style of blower wanted, giving the page which designates same and plate number.

We make five sizes, as follows:

	Diameter of Steam Ring.	Outside Diameter of Shell at mouth or air inlet end.	Outside Diameter of Shell at outlet or discharge end.						Diameter of Hole required in front of ring (square).
			Length.	Diameter.	Length.	Diameter.	Length.	Diameter.	
No. 7 Blower, Shells 20- 24" or 28" long	7"	13¼	20"	9¾"	24"	9¾"	28"	10¾"	.....
No. 7 Blower, Shells, 17" long, with flange	7"	13¼	17"	8¾"	....	....	....	....	19"
No. 6 Blower, Shells 20" 24" or 28" long	6"	12¼	20"	8¾"	24"	8¾"	28"	9¾"	.....
No. 6 Blower, Shells 17" long, with flange	6"	12¼	17"	7¾"	....	....	....	....	8¼"
No. 5 Blower, Shells 20" or 24" long	5"	11¼	20"	7¾"	24"	8¾"	....	.....	.....
No. 5 Blower, Shells 16" long, with flange	5"	11¼	16"	6¾"	....	....	....	.....	7¼"
No. 4 Blower, Shells 20" or 24" long	4"	9¼	20"	6¼"	24"	6¼"	....	.....	.....
No. 4 Blower, Shells 16" long, with flange	4"	9¼	....	....	....	....	....	.....	.....
No. 3 Blower, Shells 20" or 24" long	3¼"	8¼	20"	5¾"	24"	6¼"	....	.....	.....
No. 3 Blower, Shells 15" long, with flange	3¼"	8¼	15"	4¾"	....	....	....	.....	.....

We can furnish elbows for all the above sizes when required.

The length of the blower does not determine the size, but the diameter of the ring and shell denotes both size and power.

The No. 3 and No. 4 blowers are designed mainly for vertical boilers, and when used for such purpose should always have an elbow, so that the blower will stand vertical by the side of the boiler. The No. 5 can also be used for this purpose.

No. 3 will furnish blast for from 4 to 8 square feet of grate surface.

No. 4 will furnish blast for from 8 to 12 square feet of grate surface.

The Nos. 5, 6 and 7 are designed for all kinds of horizontal furnace constructions.

No. 5 will furnish blast for from 12 to 20 square feet of grate surface.

No. 6 will furnish blast for from 20 to 30 square feet of grate surface.

No. 7 will furnish blast for from 30 to 45 square feet of grate surface.

A furnace having from 44 to 60 square feet of grate should be equipped with two No. 6 blowers, and a furnace having from 60 to 90 square feet of grate should have two No. 7 blowers; placing them through the wall, as shown on Plate 23 in Catalogue, if possible.

All short blowers, "with flange," are designed to go through the front, or door, as shown on Plates 22, 24 and 25 in Catalogue.

These blowers are fitted up with McClave's latest improvement in Argand jetting rings, and have globe valves, union and nipples sent with each, ready to attach to steam supply pipe from the boiler.

The steam supply pipe for the Nos. 3 and 4 blower should be ½ inch in diameter, and for Nos. 5, 6 and 7, ¾ inch pipe should be used, in order to bring the full steam pressure from boiler to points of outlet.

Where a pair of either No. 6 or 7 blowers are put into the same ash-pit, then in such case a 1 inch supply pipe should be used from the dome or main steam pipe down to a point just above the pair of blowers, and from thence lead a ¾ inch branch to each blower respectively. The globe valve in such case should be placed in the 1 inch pipe so as to control the steam in both blowers at the same instant. This arrangement of pipes is necessary, no matter where or how the blowers are placed.

After the blower is set and the steam supply connections are made, then adjust the steam ring of the blower so that it will be straight across the shell, viz., at right angles with the longitudinal axis of the shell.

DIRECTIONS FOR USING.

Regulate the blast to suit the requirements by the globe valve in steam supply pipe. If the small holes should become clogged with loose scales from the steam pipe or other cause, they can be cleaned with a small wire (bent in the form of a hook), when the steam is turned on full force, but never use a tool to clean them that will either make the holes larger or ream them tapering, as the steam, to be effective in drawing in air, should issue from holes that have the same diameter all the way through the metal, and should blow from every outlet in the ring. There is no necessity for turning the Argand ring around to clean it, as the wire hook can be pulled back into the small holes when the steam is turned on. A wire hook for this purpose will be sent with each shipment of blowers and will be found attached, with the tag, to the Argand ring. After a few days' use, when the scale from the pipe will be thoroughly blown out, the blowers will need scarcely any attention as to cleaning.

These blowers are fitted up with globe valve, union, nipples, etc., ready to attach to steam pipe.

In all cases where anthracite culm is used for fuel it should be sprinkled with water before putting it on the fire, not so as to make it sloppy and heavy, but just enough to make the dust adhere to the particles of buckwheat. Anthracite screenings from coal yards should be treated in the same manner, and if they have lain out in the weather for any considerable length of time, it will be found advantageous to mix them with about one-fifth of their bulk of bituminous slack, where it is available.

IMPORTANT.—A very simple, yet very important feature in burning fine fuels successfully, where the Argand Blowers are used to furnish blast, is to close the damper in the chimney, or stack, to a point where the burning gases will not blow out through the fire-door when opened, for where there is a strong chimney or stack draft in connection with under grate blowers, a large percentage of the gases escape without igniting. Therefore, do not fail to so regulate the damper that the largest possible volume of gaseous flame may be produced in the furnace. Where the chimney draft is weak, it may be necessary to keep the damper wide open, but we have found that in the majority of cases it is not only beneficial, but absolutely essential, to regulate the dampers as described, in order to produce the best results.

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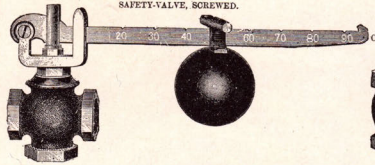
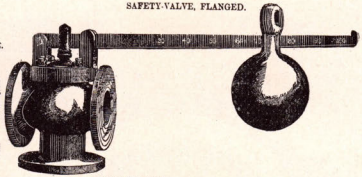
SAFETY-VALVE, SCREWED.

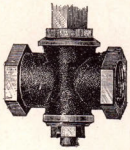


VERTICAL CHECK VALVE.

SAFETY-VALVE, FLANGED.



STEAM COCK.

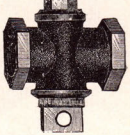


GLOBE VALVE.

ANGLE VALVE.

CROSS VALVE.

THREE-WAY STEAM COCK.

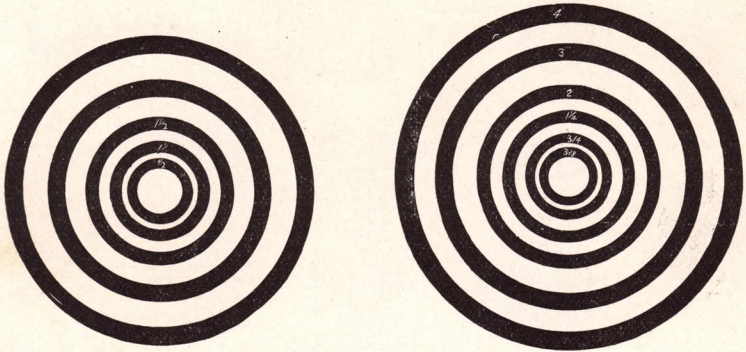


HORIZONTAL CHECK VALVE.

Size. Inches.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8
Iron Body Safety Valves, Screwed.....Each	....	....	....	....	....	3.50	4.00	5.00	5.80	7.80	13.25	17.25	23.00	28.75	34.50	41.50	57.75	93.50	132.00
Iron Body Safety Valves, Flanged.....Each	....	....	....	....	....	....	5.50	6.75	7.75	10.25	16.00	21.50	27.50	34.00	40.00	48.00	65.00	100.00	140.00
Brass Globe and Angle Valves, Screwed.....Each	.72	.72	.77	1.00	1.26	1.80	2.52	3.60	5.30	10.00	14.40	26.50	36.00	....	....	....	....	....	....
Iron Body Brass M'nt'd Globe and Angle Valves, Screwed, Each	....	....	....	....	....	2.25	2.75	3.50	5.40	7.35	9.80	....	....	....	....	....	....	....	....
Iron Body Brass M'nt'd Globe and Angle Valves, Flanged, Each	....	....	....	....	....	3.95	3.85	4.80	7.00	9.00	12.50	....	....	....	....	....	....	....	....
Iron Body Yoke Globe and Angle Valves, Screwed.....Each	....	....	....	....	....	....	....	....	7.00	9.00	12.50	15.25	19.00	24.00	27.00	37.50	63.00	72.00	....
Iron Body Yoke Globe and Angle Valves, Flanged.....Each	....	....	....	....	....	....	....	....	8.60	10.75	15.00	18.50	22.50	27.50	31.00	42.00	68.00	77.60	....
Brass Cross Valves, Screwed.....Each	....	1.25	1.25	1.50	2.00	2.50	3.50	5.00	8.00	16.00	24.00	45.00	60.00	....	....	....	....	....	....
Brass Horizontal Check Valves, Screwed.....Each	.65	.65	.70	.90	1.15	1.60	2.25	3.15	4.75	9.00	13.00	24.00	32.50	....	....	....	....	....	....
Brass Vertical Check Valves, Screwed.....Each	....	.72	.77	1.00	1.26	1.80	2.52	3.50	5.30	10.00	14.40	26.50	36.00	....	....	....	....	....	....
Brass Steam Cocks, Screwed.....Each	.85	....	1.00	1.25	1.70	2.35	3.70	4.85	7.30	14.50	22.50	38.50	50.00	....	....	....	....	....	....

WROUGHT-IRON PIPE.

SHOWING INSIDE AND OUTSIDE DIAMETERS.



JAMES BEGGS & CO., NO. 9 DEY STREET, NEW YORK.

WROUGHT-IRON PIPE—Plain.

Inside Diameter, inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Price per foot	$ .05	$ .05½	$ .05½	$ .07	$ .08½	$ .11	$ .15½	$ .26	$ .35	$ .52	$ .68	$ .81	$ .95	$ 1.25	$ 1.42	$ 1.85	$ 2.45	$ 2.95	$ 3.75	$ 4.75	$ 7.00
Weight per foot in lbs.	.24	.42	.56	.84	1.13	1.67	2.24	2.60	3.61	5.74	7.54	9.00	10.66	12.34	14.50	18.76	23.27	28.18	33.70	40.00	49.00

WROUGHT-IRON PIPE—Galvanized.

Inside Diameter, in inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6 ...
Price per foot	$ .06	$ .07½	$ .07½	$ .09½	$ 11	$ .16	$ .22	$ .31	$ 42	$ .62	$ .80	$ .98	$ 1 16	$ 1.60	$ 1.75	$ 2.20

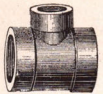
EXTRA STRONG AND DOUBLE-EXTRA STRONG WROUGHT-IRON PIPE.

Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4
Price per foot, Extra Strong	$ .11	$ .11	$ .11	$ .14	$ .17	$ .23½	$ .31	$ .52	$ .70	$ 1 04	$ 1 36	$ 1.62	$ 1.90
Price per foot, Double Extra Strong	.....	22	22	.28	34	47	62	1 04	1 40	2 73	3 67	4 25	5.00

ELBOW.

45° ELBOW.

TEE.


REDUCING TEE.

CROSS.

Y

FLANGE UNION.

SHOULDER NIPPLE.

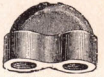
CLOSE NIPPLE.

WROUGHT-IRON COUPLING.

RIGHT AND LEFT COUPLING.

RETURN BEND, OPEN.

LIP UNION.


RETURN BEND, CLOSE.

PLUG.

BUSHINGS.

CAP.

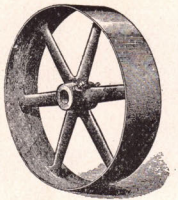
REDUCER.

FITTINGS FOR WROUGHT-IRON PIPE.

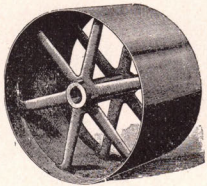
Size. Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Elbows, R. H. ..... Each	.05	.05	.06	.08	.10½	.16	.20	.38	.50	.75	1.05	1.30	1.75	2.00	2.75	4.70	6.75	9.00	13.50	20.00
Elbows, R. and L. ..... Each	.06	.06	.07	.09	.12	.18	.23	.37	.60	.85										
Elbows, Reducing. ..... Each		.06	.07	.09	.12	.18	.23	.32	.60	.85	1.20	1.40	2.00	2.30	3.15	5.40	7.75	10.00	15.50	23.00
Elbows, with Side Outlet ..... Each			.18	.24	.30	.45	.60	.84	1.50	2.25	3.15	3.60	5.25	6.00	8.25					
45° Elbows. ..... Each	.06	.06	.07	.10	.12	.19	.24	.34	.70	.94	1.25	1.45	2.20	2.50	3.45	5.90	8.50	11.25	17.00	25.00
Tees ..... Each	.08	.08	.09	.12	.16	.23	.29	.41	.72	1.16	1.50	1.75	2.55	3.00	4.00	6.80	9.75	13.00	19.50	29.00
Tees, Reducing. ..... Each		.09	.10	.14	.17	.27	.34	.47	.83	1.25	1.75	2.05	2.95	3.50	4.60	7.80	11.25	15.00	22.50	33.50
Tees, with Side Outlet. ..... Each			.27	.36	.45	.68	.90	1.25	2.25	3.40	4.70	5.25	7.65	9.00	12.00					
Crosses ..... Each		.15	.16	.22	.27	.42	.53	.75	1.30	2.00	2.70	3.15	4.60	5.50	7.25	12.25	17.50	23.50	35.00	52.50
Crosses, Reducing ..... Each			.15	.20	.26	.40	.50	.65	1.15	1.70	2.40	2.80	4.10	4.90	6.40	9.90	13.50	18.25	26.00	38.50	56.00
Y Bends ..... Each			.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	5.90	7.00	9.25	15.60	22.50		45.00	67.00
Return Bends, Close. ..... Each			.15	.20	.22	.28	.40	.57	1.20	1.70										
Return Bends, Open. ..... Each				.26	.30	.40	.52	.76	1.55	2.20										
Return Bends, Back to Back. Each				.38	.42	.60	.80	1.15	2.00	3.00										
Caps, Cast Iron ..... Each								.25	.40	.54	.75	.87	1.05	1.20	1.55	2.50	3.85	4.35	5.50	7.00
Reducers, Cast Iron ..... Each								.45	.60	.80	1.00	1.25	1.85	2.00	2.70	3.95	6.75	8.35	10.00	13.00
Locknuts, Cast Iron. ..... Each								.25	.27	.34	.47	.64	.85	.90	1.30	1.70	2.25	2.70	3.50	4.40
Flange Unions, Cast Iron. Each			.40	.46	.52	.64	.78	1.00	1.35	1.80	1.80	2.10	2.70	3.35	3.95	5.50	7.00	10.00	11.50	16.00
Flange Unions, Lip, Cast Iron Each			.60	.75	.90	1.00	1.20	1.50	1.75	2.00	2.75	3.00	3.50	4.00	5.00	7.00	10.00	15.00	17.50	20.00
Floor Plates ..... Each			.08	.08	.08	.11	.14	.16	.24	.30	.36	.42		.60	.72					
Ceiling Plates ..... Each			.11	.13	.16	.18	.25	.27	.36	.50	.65	.68		.95	1.25					
Expansion Pipe Hangers .... Each				.17	.18	.19	.25	.30	.36	.44	.55	.65	.80	1.12	1.35	1.80	2.25			
Plugs ..... .25	.02	.02	.02	.04	.05	.06	.08	.11	.14	.25	.28	.42	.65	.88	1.20	1.85	2.75	3.25	3.75	5.00
Plugs, Countersunk ..... Each			.04	.06	.08	.09	.11	.15												
Bushings ..... .50	.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.60	.75	.93	1.25	1.87	2.75	3.75	3.75	4.75	6.00
Malleable Iron Unions ..... Each	.18	.20	.22	.27	.33	.46	.58	.75	1.05	2.10	3.65	4.35								

GALVANIZED CAST-IRON FITTINGS.

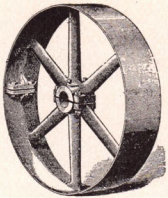
Size. Inches	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Galvanized Elbows, R. H. ..... Each	.10	.10	.12	.16	.21	.32	.40	.56	1.05	1.50	2.10	2.40	3.50	4.00	5.50	9.40	13.50	18.00	27.00	40.00
Galvanized 45° Elbows. ..... Each	.12	.12	.14	.20	.24	.38	.48	.66	1.20	1.80	2.50	2.90	4.20	5.00	6.60	11.30	17.00	22.50	34.00	50.00
Galvanized Reducing Elbows Each		.12	.14	.18	.24	.36	.46	.64	1.20	1.70	2.40	2.80	4.05	4.60	6.30	10.80	15.50	21.00	31.00	46.00
Galvanized Tees. ..... Each	.15	.16	.18	.24	.30	.46	.58	.82	1.46	2.20	3.00	3.50	5.10	6.00	8.00	13.60	19.50	26.00	39.00	58.00
Galvanized Reducing Tees. Each		.18	.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	5.90	7.00	9.20	15.60	22.50	30.00	45.00	67.00
Galvanized Crosses ..... Each		.20	.22	.32	.44	.64	.84	1.06	1.50	2.60	4.00	5.40	6.20	9.20	11.00	14.50	24.50	35.00	47.00	70.00	105.00
Galvanized Flange Unions. Each				.80	.92	1.04	1.28	1.56	2.00	2.50	3.65	4.20	5.40	6.20	7.50	11.00	14.00	20.0	23.00	32.50
Galvanized Caps, Cast Iron .. Each									.52	.80	1.08	1.60	1.74	2.10	2.40	3.10	5.00	5.70	8.25	11.00	14.00
Galvanized Reducers, Cast Iron Each									.86	1.25	1.60	2.00	2.70	3.70	4.00	5.40	10.70	13.50	16.75	20.00	30.00



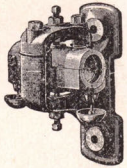
SINCLE ARM PULLEYS.



DOUBLE ARM PULLEYS.



SPLIT OR HALVED PULLEYS.



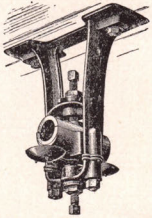
ADJUSTABLE
POST-HANGERS,

WITH BABBITTED BEARINGS, BORED AND FACED OFF.

SPLIT COLLARS.

CAST IRON,

WITH BOLTS AND SET SCREWS.



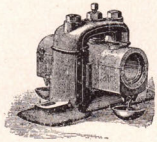
DOUBLE BRACED ADJUSTABLE HANGERS,

WITH BABBITTED BEARINGS, BORED AND FACED OFF.

COLLARS.

WROUGHT IRON,

WITH STEEL SET SCREWS, OR LOOSE.



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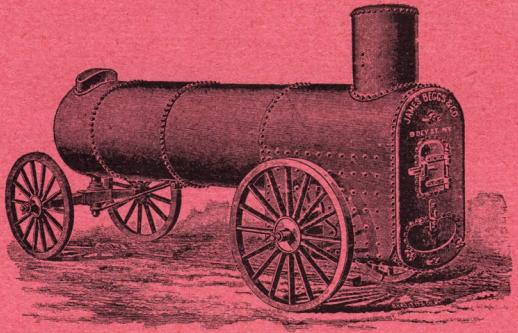
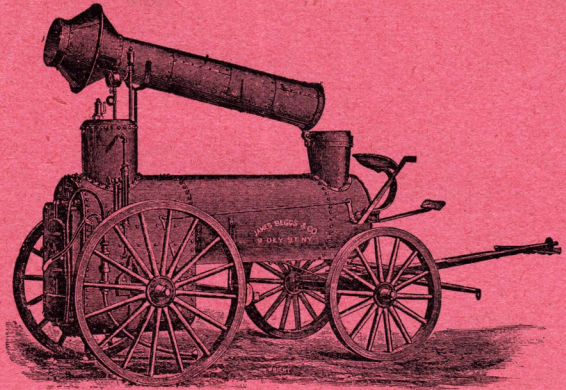


PORTABLE BOILER, WITH WATER BOTTOM AND WATER FRONT.

MOUNTED ON WHEELS.

For Specifications, see page 25.



PORTABLE BOILER, WITH WATER BOTTOM.

MOUNTED ON WHEELS.

For Specifications, see page 25.